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The Political Economy of the Cost of Foreign Exchange Intervention

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THE POLITICAL ECONOMY OF THE COST OF FOREIGN EXCHANGE INTERVENTION

A Dissertation Presented

by

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DEDICATION

To my late father, Dinesh Mohan Dutta, who made me believe that my short stature is no impediment to the heights I can reach. This one is for you, Papa. Also to Jamuna amma, who was never lucky enough to learn how to read or write, but nourished me so in my childhood, so that I could do much more.

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I remember these words that became famous during the Battle for Seattle in 1999 that have kept me going through blood, sweat, and tears. I think my PhD journey has embodied this spirit, and I hope to take this forward:

Your heart is a muscle size of your fist, keep on loving, keep on fighting.

ABSTRACT

THE POLITICAL ECONOMY OF THE COST OF FOREIGN EXCHANGE INTERVENTION

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Central Banks around the world increasingly intervene in the foreign exchange market for a variety of reasons, such as maintaining exchange rate stability and maintaining a buffer against the impact of capital flight. In fact, research shows that central banks can lean against the macroeconomic policy trilemma through maintaining reserves and intervening in the foreign exchange market, and thereby secure policy space. However, securing this policy space can come at substantial cost. This dissertation explores the political economy of these costs of foreign exchange intervention. Chapter I discusses the concept of the direct cost of intervention, calculates these costs for several countries over the period 1990–2015, and shows the trends in this cost across countries and over time. This essay shows that foreign exchange intervention and the cost associated with it has increased substantially since the 1990s. Moreover, this cost is higher for developing and emerging economies, countries with more open capital accounts, and countries with less access to a de facto international lender of last resort.

Chapter II shifts focus to the indirect costs of foreign exchange intervention. Accumulation of foreign exchange reserves by central banks has meant that they have some capacity to act as a lender of last resort, even when emergency liquidity required is not denominated in their own currency, thereby reducing the probability of default by borrowers in their country in the event of a financial crises. This chapter examines whether the accumulation of reserves due to foreign exchange intervention can be counterproductive by encouraging the inflow of volatile capital flows that are linked to the occurrence of financial crises. Using panel data regression analysis, this chapter finds that episodes of high reserve accumulation are likely to be followed by surges in inflows of capital within one year and five years, and a heightened probability of the occurrence of a currency crisis within five years. However, a higher level of foreign exchange reserve accumulation is associated with a lower probability of systemic banking crises.

Finally, Chapter III revisits the importance of institutions that form the global financial safety net in mitigating the costs of foreign exchange intervention. Chapters I and II highlight the importance of access to the global financial safety net, particularly the role played by central bank swap lines with the Federal Reserve in mitigating the costs of foreign exchange intervention. Therefore this Chapter explores the factors that explain the differential access of countries to the global financial safety net, specifically to provision of emergency liquidity by the US Federal Reserve and the Exchange Stabilization Fund of the U.S. Treasury. Specifically, it examines the relative importance of economic and political factors in determining which countries secure access to these de facto lender of last resort operations. This chapter finds that in addition to economic factors like US bank exposure and trade links, political factors like capital account openness, US unemployment rate, defense cooperation agreements, and the party composition of the US government plays an important role in determining access to these International Lender of Last Resort institutions.

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INTRODUCTION

This dissertation explores the relatively unexplored aspects of a policy tool that is widely used by Central Banks around the world: intervention in the foreign exchange market. While there is a vast literature that asks why Central Banks intervene in the foreign exchange market, whether foreign exchange intervention is effective at achieving and maintaining a desired exchange rate, and the impact of foreign exchange intervention on domestic inflation, the discussion about the costs of foreign exchange intervention and the political economy is typically considered of second order importance. In this dissertation, I work towards filling this lacuna.

The trilemma of international finance, theorized initially by John Fleming and Robert Mundell, states that it is possible to only achieve two of the following three policy objectives: a fixed foreign exchange rate, free capital movement, and an independent monetary policy. Achieving all three at the same time is impossible since the tools to achieve each individual objective would conflict with the achievement of the other objectives. Foreign exchange intervention allows policymakers in governments and central banks around the world to achieve some combination of all three policy objectives, or create policy space that can otherwise be limited by the movement of capital flows across borders. By intervening in the foreign exchange market and accumulating reserves, central banks can lean against the trillemma (Ilzetzki et al., 2017; Aizenman et al., 2010a; Steiner, 2017). However, this policy space is expensive to create and may have unintended consequences. Furthermore, policymakers in some countries can achieve this policy space in a rather inexpensive and more effective manner, that is simply not available to policymakers in most economies.

In this dissertation, I show that reserve accumulation as a result of foreign exchange intervention is expensive, and constitutes a significant continuing transfer of wealth from

developing countries to developed countries. This is the content of Chapter I. One of the motivations of holding foreign exchange reserves despite the cost involved is to protect against the effects of volatility in capital flows. However, in chapter II, I show that holding reserves could actually create moral hazard and increase the likelihood of surges of capital inflows and currency crises. Furthermore, some central banks accumulate a lower level of foreign exchange reserves, despite having high capital mobility. This is especially true of some advanced economies. One of the reasons many advanced countries do not need to accumulate expensive and, in some instances, counterproductive foreign exchange reserves is that they can access emergency lending in the global reserve currency, the U.S. dollar, from the U.S. Treasury or the Federal Reserve. In chapter III, I show that this emergency support is extended at the discretion of these institutions as it is not in their mandate to act as the lender of last resort for all economies, even though both the U.S. Treasury and the Federal Reserve have the capacity to do so. I show that several political economy factors play a role in determining this access, which results in a highly unequal global monetary system.

The goal of this dissertation is not to suggest that policy makers are not aware of these costs or unintended consequences of foreign exchange intervention. It is also not the goal of this dissertation to suggest that there are not benefits to reserve accumulation as a result of foreign exchange intervention. The goal is to contextualize the use of this policy tool and identify the trade-offs, especially insofar as they are not discussed much in the literature. Through this dissertation, I hope to elevate these concerns and highlight their importance to any evaluation of the appropriateness and effectiveness of foreign exchange intervention. I also highlight the high cost at which policy makers, especially those in developing economies, secure policy space in the presence of volatile capital flows. The discussion in this dissertation also identifies venues of inequality and instability in the global monetary system, and elements that need to be reformed.

CHAPTER 1

THE COST OF FOREIGN EXCHANGE INTERVENTION: CONCEPT, TRENDS, AND IMPLICATIONS

1.1 Introduction

Central Banks regularly intervene in the foreign exchange markets. One of the most common forms of foreign exchange intervention is sterilized sale and purchase of international reserves by Central Banks. There is evidence to suggest that interventions increasingly take the form of purchases of foreign exchange reserves (Fratzscher et al., 2016; Levy Yeyati, 2008). For instance, Fratzscher et al. (2016) find that, in the 33 countries examined, central banks intervened in the foreign exchange market on 19.1% of the trading days between 1995 and 2011; of these, interventions took the form of purchases of foreign currency on 76.1 % of the trading days. Their findings are consistent with other studies that document extensive central bank activity in the foreign exchange markets (Dominguez and Frankel, 1993; Menkhoff, 2013).

The "trilemma" of international economics states that it is only possible to maintain two of the following three policy objectives in an economy: fixed exchange rates, open capital account, and independent monetary policy. However, holding foreign exchange reserves allows central banks to weaken the constraints of the policy trilemma. As is described above, holding reserves can be used to act against undesirable movements of the exchange rate and cushion against the effects of volatile capital flows, among other things. Therefore, reserve holdings allow countries to lean against the trilemma (Ilzetzki et al., 2017; Aizenman et al., 2010a; Steiner, 2017).

Foreign exchange intervention has led to an unprecedented increase in the accumulation of foreign exchange reserves in Central Banks around the world. Moreover, this accumulation

is especially pronounced in developing countries and emerging market economies. However, as is demonstrated in this chapter, the cost of maintaining foreign exchange positions is significant. This chapter measures the cost of maintaining foreign exchange reserves by central banks, and documents its variation across countries. It also discusses the determinants of this variation across countries.

This chapter documents the substantial increase in reserve accumulation resulting from foreign exchange interventions since the 1990s. The cost associated with these interventions have fluctuated, but have increased to large and significant magnitudes in recent years. This chapter also presents preliminary evidence which suggests that, on average, developing and emerging economies incur a higher cost than advanced economies. Moreover, countries with more open capital accounts incur a higher cost as compared to countries with less open capital accounts. However, this relationship is more pronounced for developing and emerging economies, and advanced countries can choose to and are able to maintain more open capital accounts, hold fewer reserves, and incur a lower cost. The chapter discusses the role played by access to an institutional network of emergency liquidity assistance from a de facto international lender of last resort in mitigating the cost of foreign exchange intervention.

The rest of this chapter is organized as follows. Section 1.2 briefly reviews the existing literature on reasons for reserve accumulation, extent and determinants of reserve accumulation and cost of reserve accumulation and foreign exchange intervention. Section 1.3 lays out the definition of cost on which the analysis is based. Section 1.4 outlines the data used. Section 1.5 documents the extent of reserve accumulation and estimates the cost of foreign exchange intervention, while Section 1.6 discusses the determinants of these costs. Section 1.7 concludes.

1.2 Literature Review

In the heyday of neoliberal restructuring all over the world, especially since the 1990s, conventional wisdom was that any hindrances to the openness of the external account are

inefficient. Governments were expected to reduce their intervention in markets and allow the market determination of all prices, including the exchange rate. Capital controls were considered an impediment to market discovery and a hurdle that needed to be overcome in order to achieve financial and economic development. Therefore, intervention in the foreign exchange market by central banks was considered sub-optimal tool of maintaining undervalued exchange rates for the purposes of export promotion or the pursuit of mercantilist objectives. The established wisdom that market fundamentals would eventually make foreign exchange interventions unsustainable in the long run, and anticipating this, market forces would make it ineffective in the short run. The skepticism regarding foreign exchange intervention also stems from the sheer size of the foreign exchange market: it is the largest financial market in the world (Fratzscher et al., 2016). Therefore, the size of interventions is dwarfed by the volume and size of transactions that take place in a particular currency in the foreign exchange market.

Despite this skepticism, however, evidence suggests that foreign exchange interventions by central banks can be highly effective. For instance, Dominguez and Frankel (1993) find that intervention by the Federal Reserve and the Bundesbank was effective in moving the exchange rate in the desired direction in the mid-1980s. Adler et al. (2011) focus on Latin American economies to find that interventions can slow the pace of appreciation of the exchange rate. However, these effects decrease with the degree of capital account openness and are more effective in the context of already overvalued exchange rates. Fatum and Hutchison (2003) provide evidence that sterilized intervention affects the exchange rate in the short run. Menkhoff (2013) surveys the literature on exchange rate interventions and argues that foreign exchange intervention often has an impact on exchange rate level and volatility in emerging market economies. Fratzscher et al. (2016) argue that intervention has been effective tool for smoothing the path of exchange rates and in stabilizing the exchange rate in countries with narrow bank regimes. It is also effective in affecting the level of the exchange rate in flexible exchange rate regimes when interventions are large and have

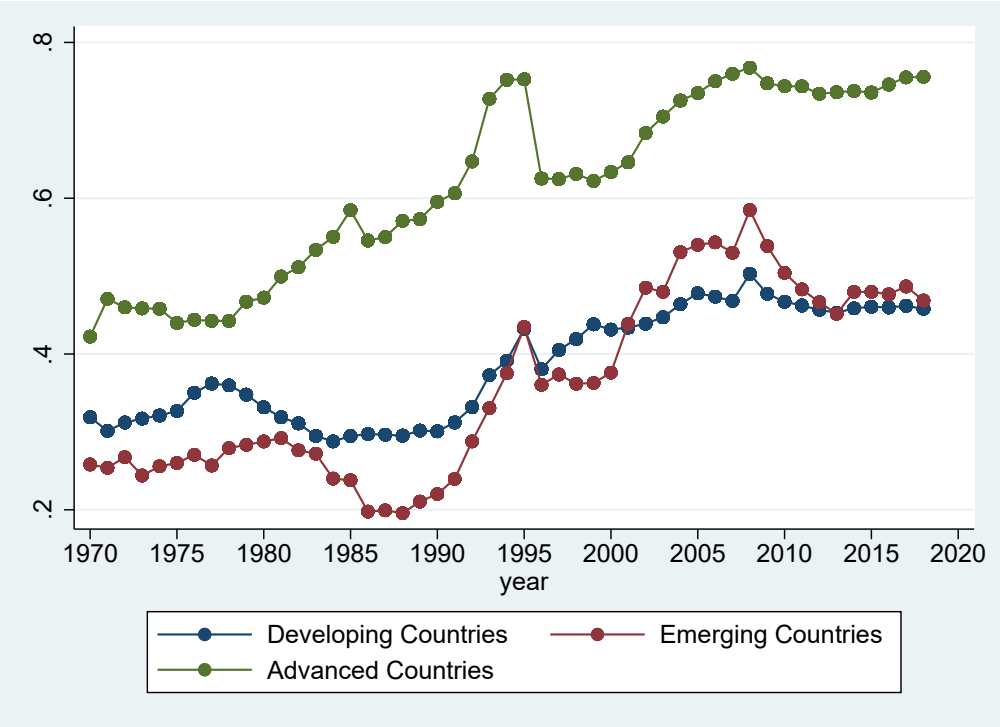
been publicly announced. Blanchard et al. (2015) find that official reserve intervention can stem pressures of currency appreciation in the face of capital inflows in emerging market economies. Therefore, the current consensus in the intervention literature seems to be that foreign exchange interventions can be effective for a variety of exchange rate related policy objectives.

In addition, official reserve holdings can provide a buffer against a freely falling currency in the event of a sudden stop or reversal in capital flows. Bussière et al. (2015) find that higher levels of reserves and capital controls prior to the 2008 crisis are associated with higher economic growth as they are both used to buffer against external shocks. Holding of international reserves equal to at least the value of short term external debt reduces the annual probability of a country experiencing a reversal in capital flows, which can precipitate and external debt and/or currency crisis, by 10 percentage points (Rodrik, 2006). Moreover, a rise in reserve holdings often lowers the cost of private debt and equity capital (Feldstein, 1999). To some extent, reserve holdings have substituted for capital controls (Ilzetzki et al., 2017). Reserve accumulation is considered a by-product of a shift to the trilemma configuration towards greater capital mobility (Steiner, 2017) engendered by financial globalization. Therefore, reserve holdings can be considered insurance against the costs of sudden stops and reversals in capital flows.

Perhaps unsurprisingly, accumulation of reserves has increased substantially with the increasing liberalization of the capital account around the world since 1990 (Rodrik, 2006) and the East Asian crisis in 1997 (Aizenman and Lee, 2005; Aizenman et al., 2010a). Capital account openness as measured by the Chinn-Ito index has increased for all groups of countries examined (Figure 1.1).[1]

[1]While the country classification into developing and advanced countries is based on the *World Economic Situation Prospects* of the UN, the classification as emerging economies is more ambiguous. Here, countries are classified based on the S&P Emerging Markets Core Index.

Figure 1.1: Capital Account Openness (Chinn-Ito Index) over time



Source: Author's calculations based on Chinn and Ito (2006a)

Some explanations for the trends in reserve accumulation can be found in the literature. Cheung and Ito (2009) find that accumulation of reserves has been pronounced in Asian economies since the Asian financial crisis. For instance, between 2000 and 2004, China, Japan, Korea, Malaysia, and Taiwan increased their holding of international reserves by 262 percent, 133 percent, 107 percent, 124 percent, and 126 percent, respectively. Similarly, Bussière et al. (2015) argue that the rate of reserve accumulation has partly been a response to crisis experienced in emerging market economies in the recent past. Countries that used more reserves in foreign exchange interventions and decumulated reserves in the past, during crises, rebuilt their reserve pool at a faster rate as compared to others in the aftermath of crises, with the rate of accumulation eventually slowing down. Bussière et al. (2015) attribute the decline in the rate of reserve accumulation to the decline in the rate of increase of short-term external debt (Bussière et al., 2015). Cheung and Ito (2009) show that the explanatory

power for traditional trade-related variables in explaining reserve accumulation is decreasing over time, while that of financial variables related to external financing has increased. They also show that, ceterus paribus, developed economies can afford to hold fewer reserve assets as compared to developing economies if faced with the same conditions. Obstfeld et al. (2010) argue that reserve accumulation is a key tool for managing financial stability in a globalized world and show that reserve growth in a broad panel of developing and developed economies is correlated with financial openness, financial development, and exchange rate policy. Dominguez (2012) shows that, during the global financial crisis, reserve accumulation was higher in countries with sovereign wealth funds, lower for countries that drew on Federal Reserve Swap Lines, higher in countries with higher short-term external debt as a proportion of GDP, higher for countries that experienced higher export growth, and lower for countries with a higher interest rate differential.

While the literature documenting the extent of reserve accumulation, and the reasons for it is extensive, the literature on the cost associated with it is quite limited, perhaps due to the perception that these costs are marginal and of second order importance Adler and Mano (2016). The trends in cost of intervention are of course related to the trends in reserve accumulation, but we cannot expect the trends in cost to exactly mirror the trends in reserve accumulation. The concept of the cost of intervention is discussed in detail in Section 1.3, but briefly, it arises because foreign exchange intervention typically involves the substitution of a higher yield asset (domestic government bonds) with a lower yield asset (foreign exchange reserve assets, typically US Treasury securities) on the balance sheet of the central bank. Since these assets are typically denominated in different currencies (Section 1.3), the changes in the relative price of these currencies or the exchange rate also play a role in determining the cost of intervention. For instance, if reserves accumulated as a result of foreign exchange intervention reduces the relative spread between domestic government bonds and reserve assets, higher reserve accumulation as a result of foreign exchange intervention need not translate into higher cost of intervention. Similarly, if intervention is

such that there is additional reserve accumulation *and* appreciation of the exchange rate, a high cost of intervention will be observed. Therefore, the trends in cost of foreign exchange intervention are not a forgone conclusion.

Among the few studies that examine the costs of foreign exchange intervention is Rodrik (2006). Rodrik (2006) approximates this cost for different country groups (developed, developing, and emerging) assuming different spread levels between the rate of interest at which private borrowers acquire external debt and the rate of interest on the reserve asset(0.03, 0.05, 0.07), and finds that the social opportunity cost of excess reserves stood at about 1 percent of GDP (for the assumed spread level of 0.05) of developing economies as of 2004. However, Rodrik (2006) does not use actual spreads for calculating costs and does not account for currency depreciation. Therefore, the costs calculated in Rodrik (2006) are approximate at best. Levy Yeyati (2008) argues that the literature on the cost of reserve accumulation overestimates the cost as it does not consider the benefits of reserve accumulation in the form of the reduced probability of crisis and the reduced borrowing costs. Therefore, Levy Yeyati (2008) argues that the marginal cost of reserve accumulation is typically overestimated by about 50 percent. Nonetheless, Levy Yeyati (2008) also does not calculate the total costs being incurred ex-post given the levels and accumulation of reserves across counties. It is worthwhile to note here that this chapter does not posit that the benefits of reserves accumulated as a result of foreign exchange intervention are insignificant; however, any reductions in borrowing costs would be incorporated into the cost of intervention (Section 1.3). Furthermore, any other benefits that are realized do not mitigate the cost as defined here.

Adler and Mano (2016) is, to the author's knowledge, the only study that systematically estimates the marginal and total costs of reserve accumulation for a set of 73 developed and developing economies during 2012-13, and find that ex-ante marginal cost incurred by the median emerging market economy was in the inter-quartile range of 2–5.5 percent per year, and total costs in the range of 0.3–0.9 percent of GDP per year. Moreover, about 20 percent

of the countries in their sample incurred greater than 1 percent of their GDP in sustaining foreign exchange reserve assets per year over the sample period. However, they consider a very limited time period and sample of countries in their calculation. Furthermore, they do not consider the patterns in the cost of intervention, as is done here. This chapter follows the method in (Adler and Mano, 2016), extends the period and sample of analysis, and discusses patterns in the cost of intervention. Furthermore, this chapter puts the cost of intervention in context of broader trends and structures in the international monetary system.

1.3 Definition of Cost

Foreign exchange reserves are typically held in the form of highly liquid safe assets, such as sovereign bonds of some developed nations, especially short term US Treasury securities. However, the cost of holding these reserves is typically much higher than the return on these safe assets. Therefore the cost of foreign exchange intervention is the cost of maintaining a given foreign exchange reserve position.

In order to consider operations that are strictly foreign exchange transactions and not monetary policy actions, the literature on foreign exchange interventions typically consider sterilized interventions by the Central Bank. A sterilized foreign exchange intervention is one in which the central bank substitutes between foreign and domestic assets on its balance sheet. Therefore, in a sterilized intervention, if the central bank purchases (sells) foreign exchange, it typically also sells (purchases) domestic assets such as government bonds through open market operations, so as to leave the monetary base and monetary policy rate unchanged.

Formally, the change in a central banks net foreign asset position, ΔNFA due to a foreign exchange operation is

$$\Delta NFA = \Delta MB - \Delta NDA \tag{1.1}$$

where ΔMB is the change in the monetary base and ΔNDA is the net domestic asset position of the central bank (Adler and Mano, 2016). If the intervention is fully sterilized,

$$\Delta NFA = -\Delta NDA \tag{1.2}$$

Adler and Mano (2016) argue that the extent of sterilization of the official reserve operation is irrelevant from the perspective of the opportunity cost of foreign exchange intervention. For instance, in the case of a reserve purchase, the extent of the operation that is unsterilized results in an expansion of the monetary base. However, this expansion could have been carried out by expanding the size of the central bank balance sheet with higher yielding domestic government assets. Therefore, insofar as a monetary expansion is brought about from purchasing foreign reserve assets which is not sterilized by the sale of domestic government assets, an opportunity cost is still created. This is because this monetary expansion could, alternatively, have been created by purchasing higher yielding domestic government assets. Therefore, the marginal cost of the operation would be the opportunity cost of increasing the foreign exchange reserve asset position of the Central Bank. The cost of carrying, measured by deviations from uncovered interest parity:

$$MC_{k,t+1} = \frac{1 + i_{k,t}}{1 + i_t^*} \frac{S_{k,t+1}}{S_{k,t}} - 1 \tag{1.3}$$

where $i_{k,t}$ is the nominal interest rate on the domestic government assets, i_t^* is the nominal interest rate on the reserve asset, and $S_{k,t}$ is the exchange rate expressed as the units of local currency per unit of foreign currency. The uncovered interest parity condition, in this context, is the condition under which there is no incentive to hold domestic government assets over reserve assets, as there is no arbitrage opportunity. Therefore, ex-post, deviations from this condition measures the cost of holding the reserve asset as opposed to the domestic government asset.

Two things should be noted as regards the definition of the costs of intervention. First, the cost as it is being measured is not necessarily the *book cost* of intervention, that is, it

is not the cost that is reflected in the central bank's balance sheet. The book cost would depend on the degree of sterilization of the foreign exchange intervention. The cost that is being considered here is the *opportunity cost*, based on the next best alternative to foreign reserve assets on the central bank's balance sheet. Second, the cost being measured here is the quasi-fiscal opportunity cost incurred by the central banks. Some literature, notably Rodrik (2006), measures opportunity cost to the economy as a whole, by considering the spread between private borrowing costs in the economy and the return on the foreign reserve assets. This formulation is likely to result in the overestimation of the cost of intervention, as private borrowing costs in any economy are typically higher than the borrowing costs of the sovereign, or the nominal interest rate on domestic government assets ($i_{k,t}$ in Equation 1.3) of a comparable term. However, this formulation of opportunity cost is unsatisfactory as foreign exchange interventions are typically not undertaken through the sale and purchase of bonds issued by private borrowers in an economy [2]. Moreover, it is not clear, in this formulation which actors in the economy are bearing this cost of intervention.

Taking logarithms on both sides of equation 1.3,

$$\begin{aligned} mc_{k,t+1} &= ln(1 + MC_{k,t+1}) \\ &= ln(1 + i_{k,t}) - ln(1 + i^*_t) + ln(S_{k,t+1}) - ln(S_{k,t}) \\ &\approx (i_{k,t} - i^*_t) - \Delta s_{k,t+1} \end{aligned} \tag{1.4}$$

where $\Delta s_{k,t+1}$ is the log change in exchange rate from time t to $t + 1$.

The total cost of foreign exchange intervention is thus

$$TC_{k,t+1} = MC_{k,t+1} \times NFA_{k,t} \tag{1.5}$$

[2]Unconventional monetary policy during the recent financial crisis in some countries, notwithstanding

Since most central banks are quasi-government bodies that typically transfer their surpluses to the government, this total cost is the quasi-fiscal cost of foreign exchange intervention. Therefore, this is a direct loss to the government surplus, and a diversion of government budgetary resources away from other uses of fiscal resources. Moreover, it directly increases the size of the government budget deficit.

1.4 Data

In order to calculate cost of intervention, therefore, data on reserve positions built as a result of foreign exchange intervention, interest rate spreads, and exchange rate are required. This data is acquired from the International Financial Statistics produced by the IMF, World Development Indicators produced by the World Bank, and OECDstat. In addition, data on capital account openness is based on the index created by Chinn and Ito (2006a). This index is a composite of a variety of factors that determine the degree of capital account openness based on the Annual Report on Exchange Arrangements and Exchange Restrictions. A complete list of variables used and their sources are listed in Appendix A.1 .

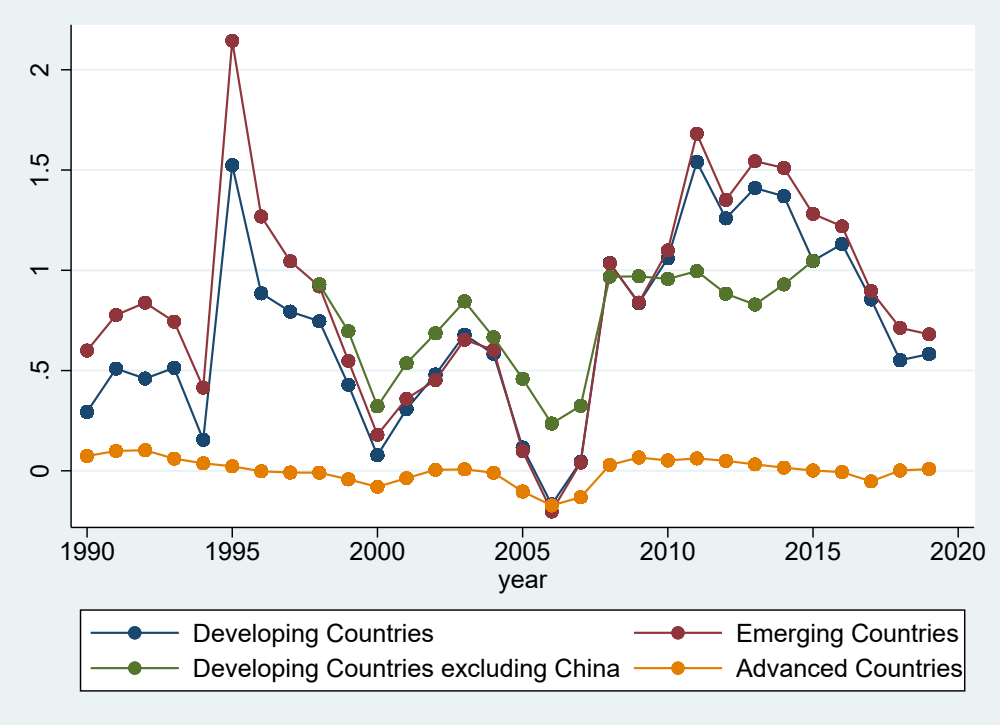
The classification of countries into advanced and developing is based on the classification of the United Nations Conference on Trade and Development (UNCTAD). The classification of countries into emerging markets is slightly trickier as UNCTAD and other multilateral organizations do not classify countries as emerging market economies. It seems more to be a matter of convention and varies from study to study. For the purposes of this chapter, the classification of Chinn and Ito (2006a) is used. The complete list of countries studied and their classifications are listed in Appendix A.2.

1.5 Extent and Cost of Foreign Exchange Intervention

Based on the definition of quasi-fiscal costs in Section 1.3, the trends in the costs of foreign exchange intervention can be observed in Figure 1.2. As mentioned previously, the cost of foreign exchange intervention has been estimated as the deviations from uncovered

interest parity. This quasi-fiscal cost of holding reserves is calculated based on the spread between short-term sovereign bonds and US Treasury Securities. Since no interest is received on reserves held in the form of gold, these are excluded in the calculation of costs of holding reserves [3].

Figure 1.2: Quasi-Fiscal Cost of Reserves (% of GDP)



Source: Author's calculations

It is evident from Figure 1.2 that, while there is significant variation in the cost incurred by these country groups over time, the average cost incurred by advanced countries is lower than the average cost incurred by developing and emerging economies. The cost incurred by all countries peaked in 2011; however, the emerging economies incurred an average cost of

[3]While appreciation in the price of gold can be considered a return on reserve holdings, they are excluded in the estimation of costs in Figure 1.2. This is unlikely to significantly affect the cost estimate since an increasing proportion of reserves are being held in the form of non-gold assets at least in developing and emerging economies. However, about 50 % of reserves of advanced economies are held in the form of gold reserves.

nearly 3 percent of the GDP, while advanced economies incurred an average cost of less than 1 percent of GDP. This trend is also reflected in the trends in reserve accumulation, which are shown in Figure 1.3. The dramatic decline in costs in 2015 are likely to be due to an appreciating dollar, as even though reserve accumulation has reduced, it has not dramatically collapsed.

Table 1.1 shows the summary statistics of the costs incurred by year by developing countries. The average understates the magnitude of the costs incurred by some countries; therefore, table 1.1 also lists the maximum cost incurred in any given year after 1990 and the country incurring it.

The magnitudes of the costs are not insignificant. For instance, in 2000, the Government of Ghana spent 1.5 percent of its GDP on healthcare, but incurred nearly 4.3 percent of its GDP in conducting foreign exchange intervention. In 2010, government expenditure on education in Lebanon was 5.5 percent, which is comparable to the cost it incurred on foreign exchange intervention reserves (4.3 percent). In the middle of a severe financial crisis, the Icelandic economy spent 4.5 percent of its GDP on foreign exchange intervention.

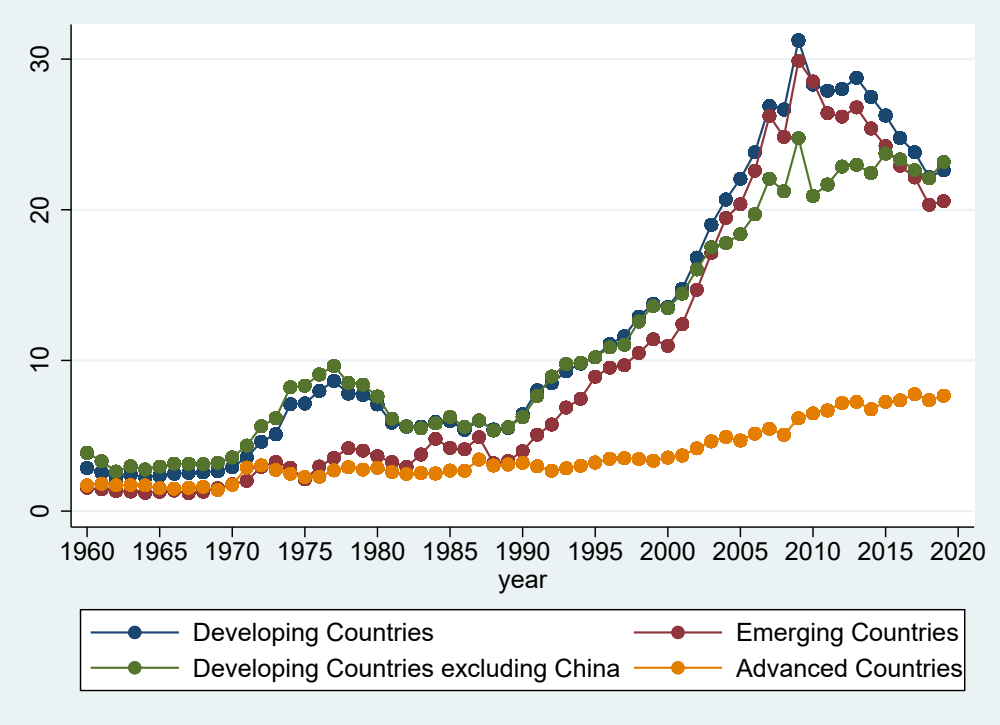
Figure 1.4 shows the accumulation of reserves in months of imports. A marked upward trend in reserve accumulation can be observed since 1990 in both Figures 1.3 and 1.4. As a rule of thumb, it is considered good practice for central banks to maintain reserves worth three months of imports (This is the Guidotti-Greenspan-IMF rule (Rodrik, 2006)), as maintaining liquidity is considered to be the "key to financial self-help." Countries that hold substantial internationally liquid foreign currency reserves and/or a ready source of foreign currency loans are considered to be less likely to experience a speculative currency attack (Feldstein, 1999). However, central banks have been holding reserves far in excess of the three month convention. Interestingly, the level of reserves in terms of months of imports has remained quite stable around the 3-month mark for advanced countries.

Table 1.1: Summary Statistics: Quasi-fiscal cost of Foreign Exchange Reserves of Developing Countries

Year	**Mean**	**Standard Deviation**	**Maximum**	**Country incurring Maximum cost**
1990	0.21	0.89	2.54	Lebanon
1991	0.74	1.51	8.46	Guyana
1992	0.94	1.81	11.16	Guyana
1993	1.06	1.63	7.52	Guyana
1994	0.98	1.60	6.08	Guyana
1995	0.99	1.59	6.79	Hungary
1996	1.12	1.61	7.29	Moldova
1997	0.99	1.64	8.48	Romania
1998	0.94	1.48	7.83	Kyrgyz Republic
1999	1.02	2.18	15.63	Kyrgyz Republic
2000	0.70	1.50	9.74	Kyrgyz Republic
2001	0.94	1.19	5.72	Kyrgyz Republic
2002	1.14	1.27	5.69	Uruguay
2003	1.19	1.28	5.39	Uruguay
2004	0.92	1.00	5.09	Yemen
2005	0.49	0.81	4.27	Yemen
2006	0.25	0.79	4.29	Yemen
2007	0.44	1.09	5.89	Iraq
2008	1.05	1.22	6.17	Iraq
2009	1.25	1.11	5.04	Lesotho
2010	1.03	0.88	3.93	Yemen
2011	1.02	0.92	4.27	Kyrgyz Republic
2012	1.02	0.93	4.07	Mongolia
2013	0.84	0.76	3.43	Lesotho
2014	0.83	0.82	4.35	Uruguay
2015	0.91	1.06	4.57	Moldova
2016	0.96	1.05	4.11	Moldova
2017	0.79	1.05	5.85	Mozambique
2018	0.50	0.75	2.97	Mozambique
Total	0.88	1.27	15.63	Kyrgyz Republic

Source: Author's calculations

Figure 1.3: Foreign Reserves (excluding gold) as a share of GDP (%)



Source: Author's calculations

1.6 Factors that determine the Cost of Intervention

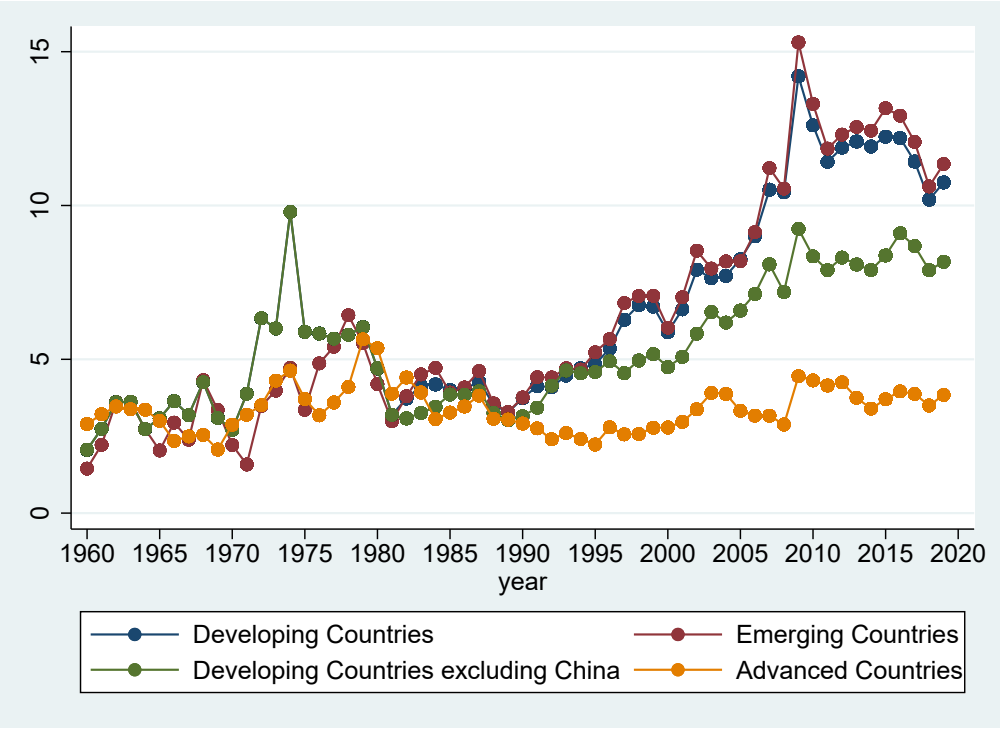
This section explores the patterns in cost of intervention, specifically by country group and other important aspects of the international monetary system.

1.6.1 Country Group

In 2014, EMEs and developing economies incurred a cost of 1.51 percent and 1.37 percent of their GDP, respectively, for holding reserves. By contrast, advanced nations earned a return of 0.02 percent on their reserve holdings in 2014. This is consistent with the results in Adler and Mano (2016) [4]. Figures 1.5 through 1.7 show histograms of the distribution of quasi-fiscal costs incurred by developing countries and advanced countries by year. In

[4]Unfortunately, a more extensive comparison with the cost estimates in the literature are not possible as no other study has calculated costs for a broad sample of countries over the time period under consideration.

Figure 1.4: Foreign Reserves (excluding gold) in months of imports



Source: Author's calculations

several of the years shown (2009, 2010, 2011, 2012, 2015, 2016, 2and 017), the distribution of cost for developing countries is to the right of those of advanced economies, while in several other years the two distributions overlap significantly.

Once again, it is interesting to note that advanced economies are on average incurring close to zero quasi-fiscal costs over the period under consideration. The average cost incurred by advanced nations has ranged between -0.17 percent of GDP and 0.10 percent of GDP since 1990. Clearly, advanced economies are able to incur lower average costs partly because central banks in these countries are holding a higher share of their reserves in the form of gold as opposed to foreign currency assets (Figure 1.8) and partly because they simply do not hold significant reserves. However, these lower costs are interesting especially since, on average, the advanced economies have more open capital accounts (Figure 1.1).

Figure 1.5: Histogram of Quasi-fiscal cost of developing and advanced countries in 2015–2018

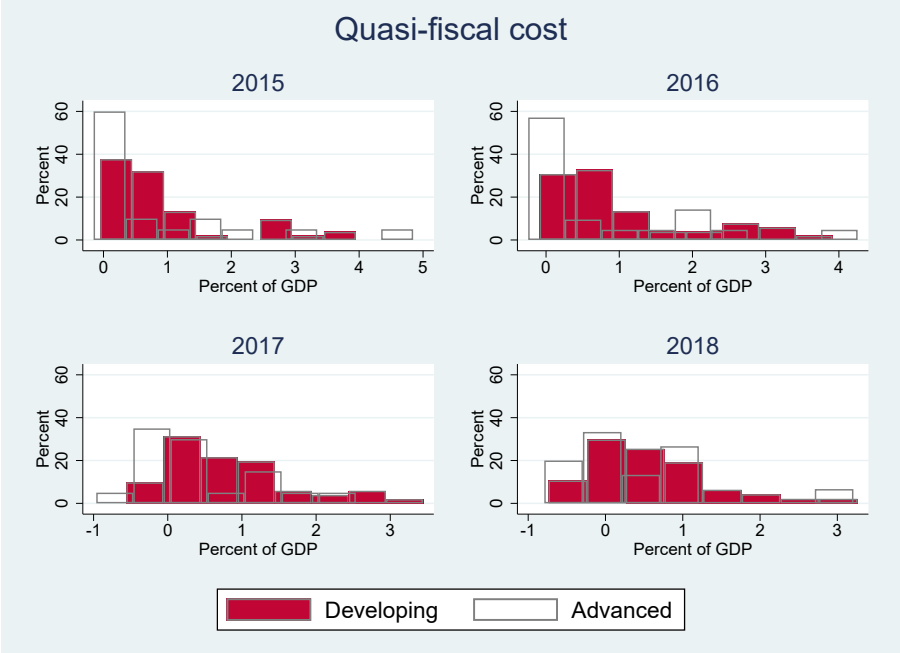


Figure 1.6: Histogram of Quasi-fiscal cost of developing and advanced countries in 2011–2014

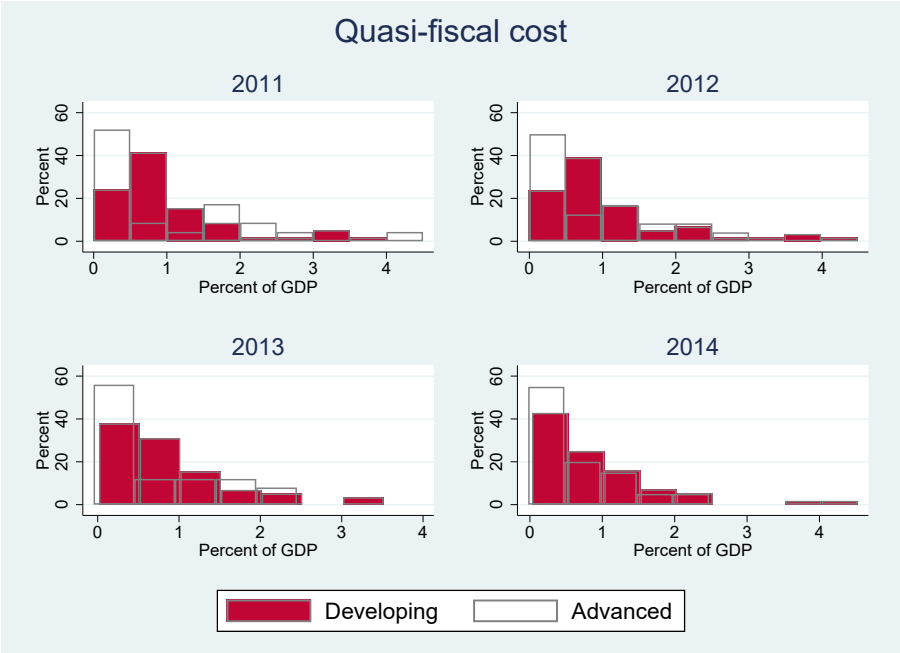


Figure 1.7: Histogram of Quasi-fiscal cost of developing and advanced countries in 2007–2010

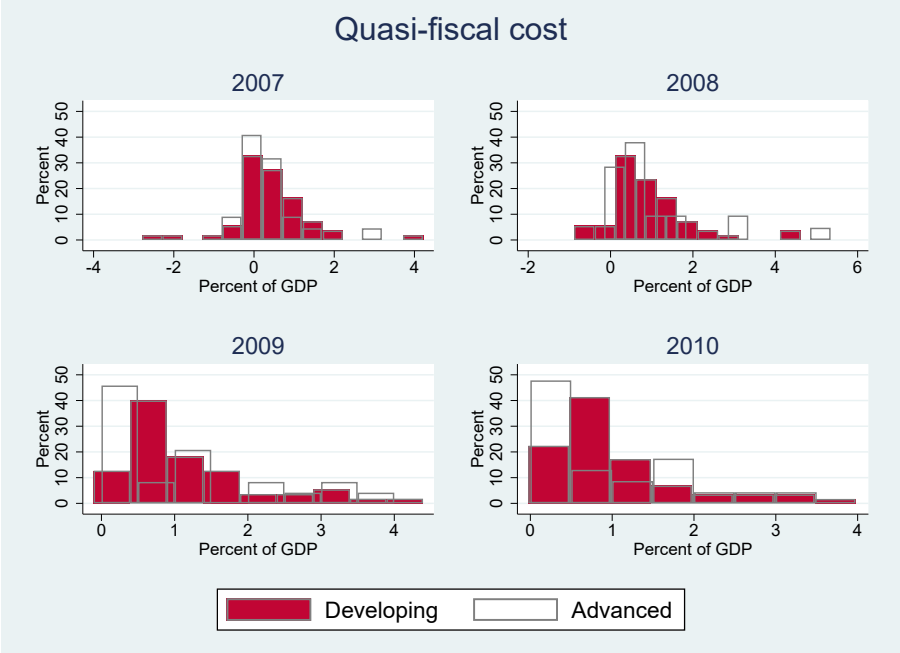
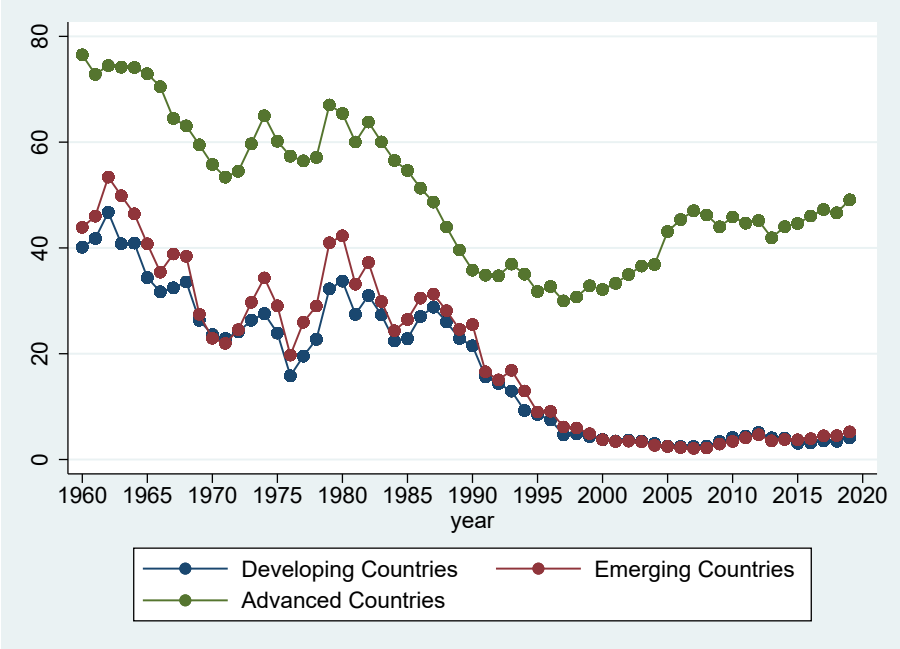


Figure 1.8: Share of Reserves held in Gold, (%)



1.6.2 Capital Account Openness

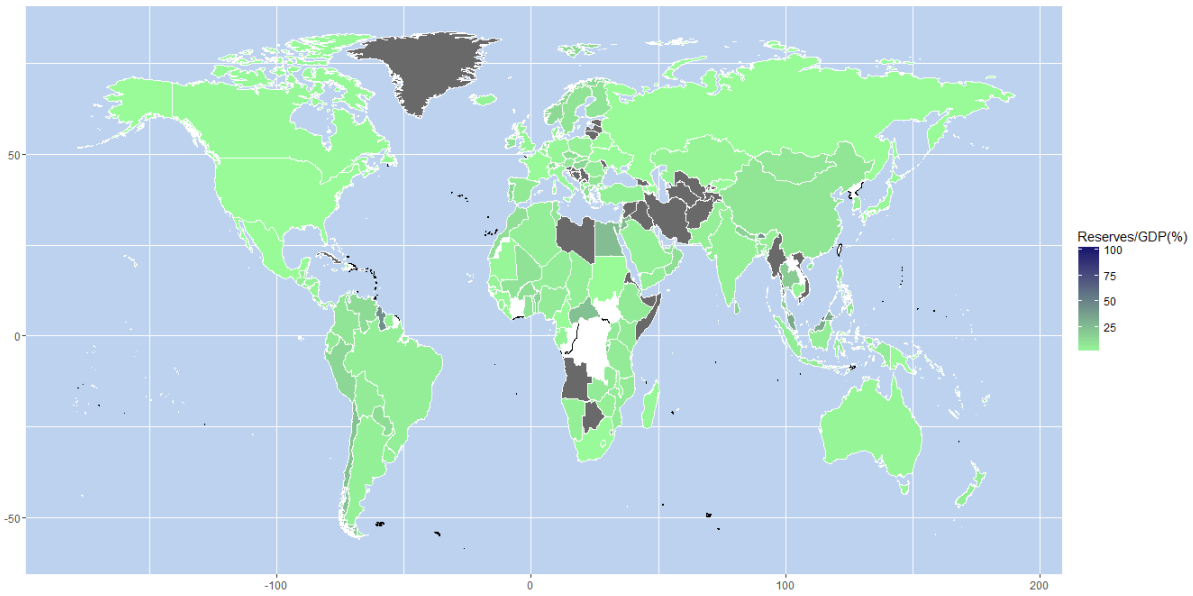
In addition to the disparity between the cost incurred by emerging and developing economies as a group and advanced economies as a group, there is also significant variation within these groups. In 2014, the Reserves to GDP ratio varied from 2.56 percent in Zimbabwe to about 113 % in Hong Kong. Official reserve interventions can be seen as a substitute for capital controls (Steiner, 2017; Ilzetzki et al., 2017). From figures 1.9 and 1.10, we can see that both the reserves to GDP ratio in several countries in the world and the degree of capital account openness has increased between 1994 and 2014. The darker the shade in Figure 1.9 and 1.10, the higher is the reserve to GDP ratio and degree of capital account openness of the economy, respectively. However, it is not immediately apparent if countries with more open capital accounts have higher reserve accumulation and higher costs of foreign exchange intervention.

A different picture emerges if the correlation between cost incurred and capital account openness is analyzed for advanced countries and developing countries separately. Figure 1.11 shows the scatterplot between the cost of foreign exchange intervention and capital account openness in the years 2011–2014 separately for advanced countries and developing countries. In the four years shown, the cost of foreign exchange intervention and capital account openness (as measured by the Chinn-Ito index) exhibits a mildly negative relationship in advanced nations, that is, advanced nations that have more open capital accounts incur lower costs. However, developing countries with more open capital accounts incur higher costs. This relationship is also observed for the total period under consideration (1990–2018).

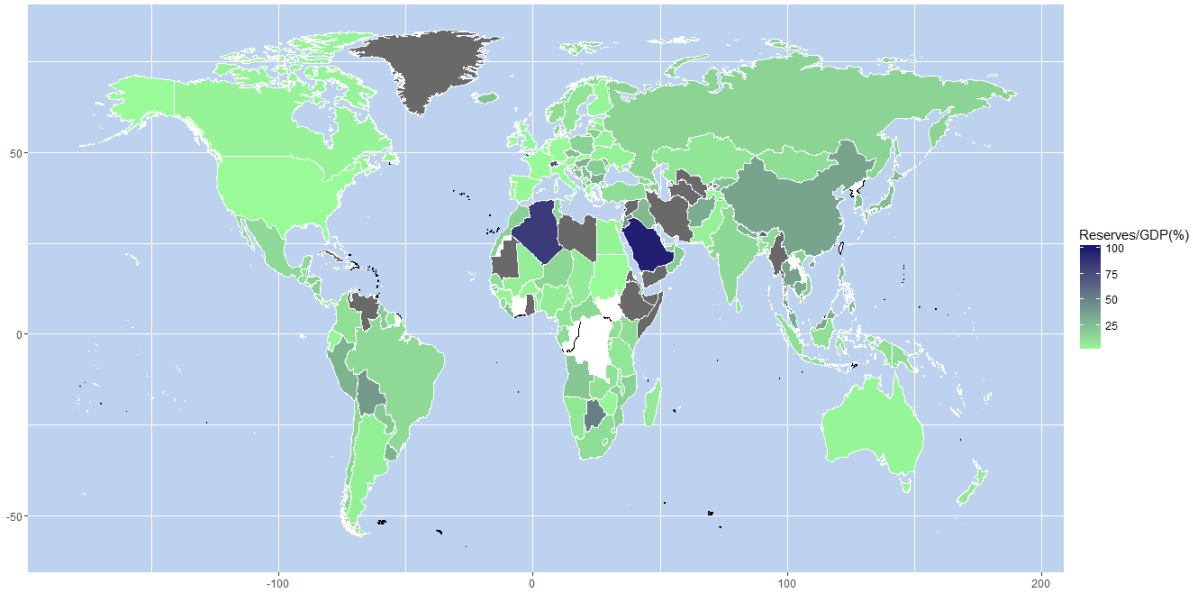
1.6.3 Trade and Financial Variables

The size of a country's trade and exchange rate volatility is likely to affect the extent of foreign exchange intervention. However, in their exploration of the determinants of reserve holdings, Obstfeld et al. (2010) compare whether trade related or financial variables offer a better explanation for the accumulation of reserves. They argue that financial motives have

Figure 1.9: Reserves to GDP ratio, 1994 and 2014



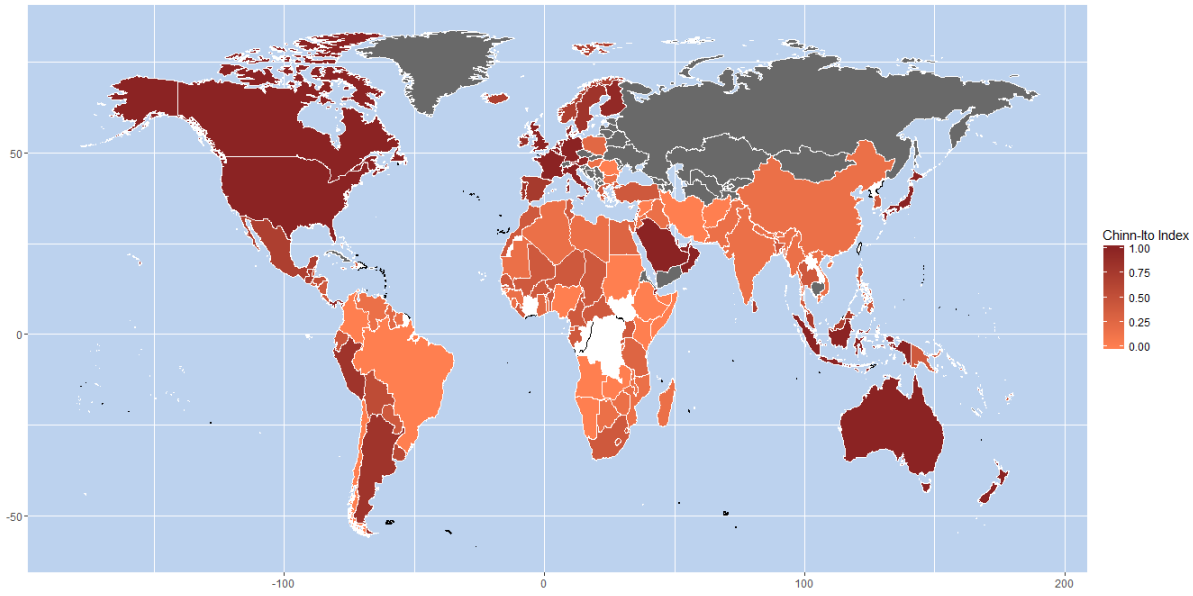
(a) 1994



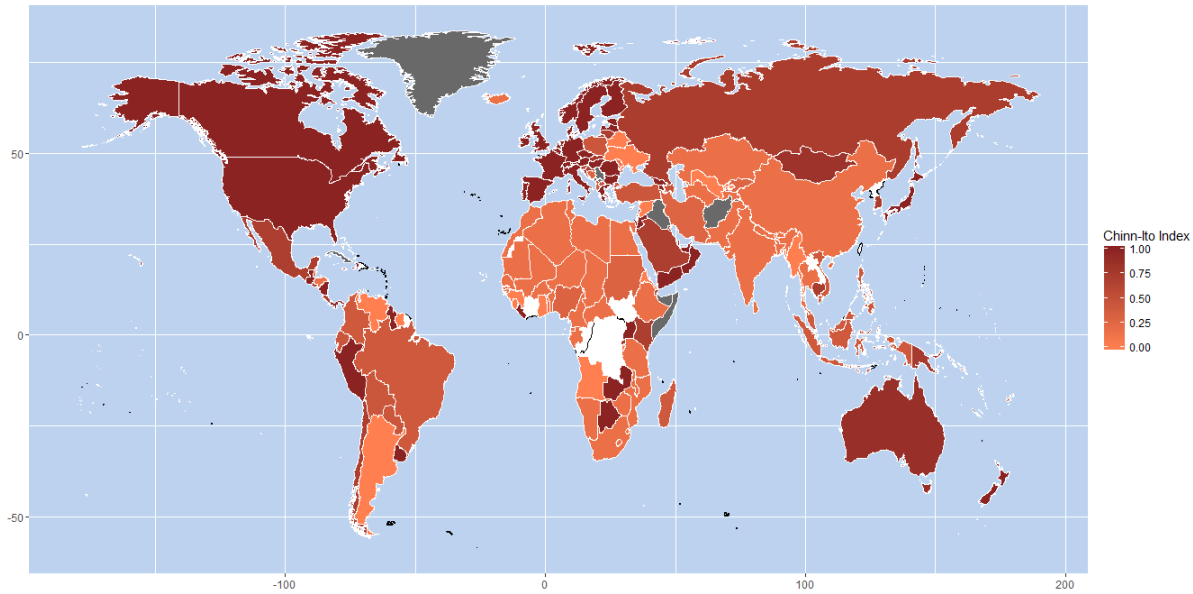
(b) 2014

Note: Countries are shaded gray if data was not available

Figure 1.10: Capital Account Openness, 1994 and 2014



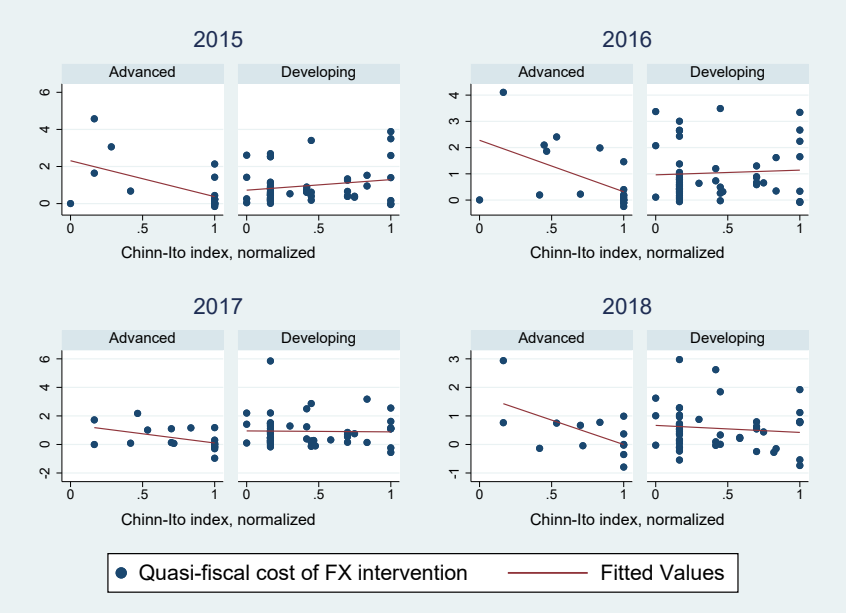
(a) 1994



(b) 2014

Note: Countries are shaded gray if data was not available

Figure 1.11: Scatterplot of Quasi-fiscal Cost and Capital Account Openness, 2015–18



always been an important motivation for the accumulation of reserves as an adverse shock to the balance of payments can arise from domestic deposit holders moving their assets abroad. In other words, in addition to sudden stops and share reversals of capital flows, capital flight is associated with domestic financial instability, and therefore domestic financial stability is an important consideration as regards reserve accumulation. The central bank can stem the depreciation pressure in this event using its reserves. Obstfeld et al. (2010) argue that since the extent of the flight of capital out of domestic bank deposits depends on the size of M2 or the broad money supply, its size should play a role in determining the size of the reserve holdings of the central bank. Consequently, the size of M2 should play a role in determining the cost of foreign exchange intervention.

Additionally, the nature of the exchange rate regime is likely to have an impact on the size of reserve holdings. Have a pegged or de facto pegged exchange rate would require central banks to sell foreign exchange to stem pressures on the currency to depreciate and absorb foreign exchange to stem pressures on the currency to appreciate. Therefore, central banks in economies with pegged exchange rates are likely to hold higher reserves.

1.6.4 International Lender of Last Resort

It is striking that this system is consistently less expensive for advanced countries (Figure 1.2). And this is despite the case that, on average, advanced economies are likely to have more open capital accounts than developing economies (Figure 1.1). Why has this been the case? Feldstein (1999) argues that the only way to maintain private lending in an economy and increase credit is to ensure that lenders are reasonably sure of receiving a return on their investment. This can be done through ensuring the availability of some form of collateral. International reserves provide one form of collateral. However, a credible international lender of last resort to which borrowers could turn to in the event of financial distress eliminates the need for such collateral. While some institutions have historically functioned as international lenders of last resort at specific historical moments, in general there is no such consistent international lender of last resort. However, there are several institutional mechanisms through which the provision of an international lender of last resort is mimicked in times of financial distress. One such institutional arrangement is swap lines between central banks of several advanced economies. The role of these swap lines was exceptionally important during the current financial crisis. However, not all countries have, historically, had access to the International Lender of Last Resort in this form. This is particularly noteworthy since multilateral organizations such as the International Monetary Fund have not been very effective in playing the role of the International Lender of Last Resort.

In the context of the British banking system in the 19th century, Bagehot (1873) argued that, in order to avoid a financial crisis in the face of a bank run and prevent a shortage of liquidity, the lender of last resort or the monetary authority should provide unlimited and automatic credit to any party with good collateral (McDowell, 2017). However, in general, no individual central bank can serve as central banks for the global financial system. McDowell (2017) defines the International Lender of Last Resort as "an actor that is prepared to respond to international financial crises by providing credit to illiquid institutions in foreign

jurisdictions when no other actor is willing or able" (McDowell, 2017). In lender of last resort operations, time is of the essence, as in the absence of timely injection of liquidity, a liquidity crisis can quickly morph into a solvency crisis. In this regard, the IMF has been inadequate as an international lender of last resort as it is moves slowly only to often provide inadequate liquidity to financial systems in distress. However, in several instances, institutions in the United States have provided liquidity to foreign governments for the purposes of managing financial crises in the post-War period. Specifically, the Exchange Stabilization Fund of the US Treasury and the swap lines extended by the Federal Reserve has historically functioned as an international lender of last resort. Between 1980 and 2000, institutions in the United States effectively acted as the lender of last resort on 40 different occasions for about 20 countries (McDowell, 2017).

However, the United States has not uniformly provided the international lender of last resort facility uniformly. McDowell (2017) argues that the institutions that can function as the international lender of last resort in the United States, which are the Exchange Stabilization Fund of the US Treasury and the swap lines of the Federal Reserve in this analysis, have only done so for foreign governments to prevent the collapse of their financial systems only insofar as the potential collapse of these financial systems jeopardizes the stability of the US financial system. This is not surprising since neither of these institutions has a mandate of stabilizing the global financial system. However, these institutions, specifically the Federal Reserve is likely to be the most effective stabilizer of the global financial system since it has the power to create the global reserve currency, that is, the US dollar. The importance of access to these institutions is indicated in the literature. For instance, (Bordo et al., 2014), find that during the Bretton Woods era, the mere announcement of an increase in the available credit under a pre-existing swap line stemmed the speculative sales of a deficit country's currency, even if the increased credit line was not actually drawn upon.

Specifically, the international lender of last resort facility has mostly been extended to advanced nations. Insofar as some developing countries have been recipients of assistance

from the institutions that can function as international lender of last resort, the assistance has been less robust as compared to that received by advanced nations. The Central Bank swap lines provided to the central banks of advanced nations were very large: in most instances, the size of the swap exceeded 50 percent of actual reserves. In the case of the European Central Bank, the size of the swap was larger than the size of the reserves held. However, for developing economies, the size of the swap never exceeded more than 50 percent of the reserves held (Obstfeld et al., 2009).

Therefore, the quasi-fiscal costs of holding reserves can potentially be mitigated by the extension of these institutional arrangements to developing countries, or creation of parallel arrangements between developing countries. To this end, several developing countries and emerging economies have formed regional agreements and mechanisms such as the Chiang Mai Initiative (CMIM), The Latin American Reserve Fund (FLAR), Arab Monetary Fund (ArMF), and the New Development bank and Contingent Reserve Arrangements of the BRICS countries (Grabel, 2015).

Being excluded from this institutional network of lender of last resort operations partly explains the large accumulation of reserves and the cost associated with it. This suggests that the trends described in the chapter are not inevitable and can be avoided by, among other things, including emerging markets and developing economies in the access to the lender of last resort facility.

1.7 Conclusion

This chapter documents the cost incurred in fairly common policy decisions undertaken by Central Banks all over the world, namely the cost of foreign exchange intervention. It shows that reserve accumulation resulting from foreign exchange interventions have increased substantially since the 1990s. The cost associated with these interventions have fluctuated, but have increased to large and significant magnitudes in recent years. The average policy configuration has moved away from the use of capital controls to manage the external

account towards the reserve accumulation through frequent foreign exchange intervention. This has become standard practice in the existing international monetary system. However, this specific policy configuration is an expensive proposition as there is a significant cost associated with it. This cost is of concern as it is typically considered of second order importance, and therefore has not drawn significant and systematic scrutiny. However, this chapter shows that its magnitude is not insignificant. Government surpluses always have many competing uses, and this cost being incurred by the fisc necessarily means that these resources can not be used for a competing purpose, such as expenditure on health, education, poverty alleviation programs, or subsidies for crucial manufacturing industries. This is not to say that the trade-off is not worth it, as there are many reasons why central banks should hold reserves. The benefits are varied, but are unlikely to affect the calculation of cost here. However, the the size of the trade-off varies across countries, which suggests that it is not inevitable. Furthermore, this cost constitutes a direct transfer from developing and emerging economies to the advanced nations, the assets of which are typically held as foreign exchange reserves, and to the United States in particular.

The chapter also hypothesizes the reasons for this variation. Specifically, evidence suggests that, on average, developing and emerging economies incur a higher cost than advanced economies. Moreover, countries with more open capital accounts incur a higher cost as compared to countries with less open capital accounts, which is consistent with the hypothesis that reserve accumulation through foreign exchange interventions has substituted for capital controls to some extent. However, this relationship is more pronounced for developing and emerging economies, and advanced countries are able to maintain more open capital accounts, hold fewer reserves, and incur a lower cost. This may be due to a variety of trade and financial variables, such as the exchange rate regime. However, it is also likely that access to an institutional network of emergency liquidity assistance from a de facto international lender of last resort, access to which is more common for advanced economies, reduces the need for foreign exchange intervention and reserve accumulation. The extent of the impor-

tance of these factors, and other potential factors, will be examined systematically in the subsequent chapters.

The data used in this chapter uses annual data obtained from the World Bank and the IMF because most central banks do not make their intervention data public. However, a more granular look at the trends in cost of intervention for countries that make their intervention data public can be instructive, especially since it can be analyzed in the context of changes in economic policy. We hope to do this in subsequent research.

CHAPTER 2

CAN RESERVE ACCUMULATION BE COUNTERPRODUCTIVE?: THE UNINTENDED CONSEQUENCES OF FOREIGN EXCHANGE INTERVENTION

2.1 Introduction

Foreign exchange intervention by central banks can be highly effective in terms of several criteria. As is discussed in Dutt (2018), foreign exchange intervention can be effective in moving the exchange rate in a desired direction, it can slow the pace of appreciation of the exchange rate, it can reduce volatility in exchange rates, it can smooth the path of exchange rates, and it can stem pressures of currency appreciation in the face of capital inflows in emerging market economies. In addition to exchange rate related policy objectives, official reserve holdings can lower the cost of private debt and equity capital. Most importantly, foreign exchange reserves provide a buffer against a freely falling currency in the event of a sudden stop or reversal in capital flows. In particular, Aizenman and Lee (2005) show that the purpose behind this reserve accumulation has been precautionary. Jeanne and Rancière (2007) also find that the negative impact of a reversal of capital flows on domestic absorption is mitigated by the reduction in official reserve holdings.

Moreover, official reserve interventions are likely to reduce the likelihood of a sovereign default on external debt. Additionally, since private borrowers in most countries suffer from the 'original sin', that is, the inability to undertake external borrowing in their own currency, the official reserve interventions are also likely to reduce the currency risk that lenders undertake. Therefore, official reserve holdings are likely to make lending to countries in which central banks hold foreign exchange reserves a relatively lower credit risk. However,

the costs of this foreign exchange intervention are usually considered to be marginal and of second order importance (Adler and Mano, 2016). Dutt (2018) and Chapter 1 argue that the opportunity cost of holding these reserves are substantial and related to the absence of an International Lender of Last Resort. This chapter argues that, in addition to the opportunity costs of holding foreign exchange reserves on the balance sheets of Central Banks, reserve accumulation may be imposing an indirect cost on countries by creating moral hazard for international lenders, and encouraging higher capital inflows. We argue that reserve accumulation is positively associated with higher capital inflows in the future.

This question is relevant because the one of the best predictors of financial crises can be shown to be excessive credit growth (Schularick and Taylor, 2009). In particular, gross flows of capital can serve as a source of significant instability, even if net flows do not reflect an imbalance in the balance of payments. The relationship between the official reserve holdings and the net external account is the following accounting identity:

$$\begin{aligned} \text{Balance of Payments} &\equiv \text{Current Account} + \text{Capital Account} \\ &\quad + \text{Official Reserve Position} \\ &\equiv 0 \end{aligned} \tag{2.1}$$

There is no such obvious relationship between the official reserve position and the gross inflow of capital into the economy. Determining this relationship is especially important because of the increasing degree of capital account openness, as is evident from Figure 1.1. Moreover, since economists increasingly argue that official reserve holdings are a substitute for capital controls, it is natural to examine the role reserve holdings play in the management of the capital account or the lack thereof.

This chapter presents evidence that questions the mitigating influence of reserve holdings on the occurrence of financial crises.

The rest of the chapter is structured as follows. Section 2.2 surveys the existing literature on the topic. Section 2.3 lays out the central hypothesis of the chapter. Section 2.4 describes the data used in this study and its sources, while Section 2.6 presents the methodology used to examine the hypothesis presented in Section 2.3 and our results. Section 2.7 discusses the results and concludes.

2.2 Literature Review

In order to investigate the impact of reserve accumulation and capital inflows, we examine three strands of literature. First, we explore the limited literature on direct relationship between higher reserve accumulation and higher capital inflows. Second, we examine the literature on the determinants of capital flows, and finally, we rely on the literature on early warning systems for financial crises.

2.2.1 Literature on Relationship between Higher Reserve Accumulation and Higher Capital Inflows

There is some limited literature that directly engages with the question of the relationship between reserves accumulated as a result of foreign exchange accumulation and capital flows. Dooley (2000) builds a model of crisis in emerging market economies that develops without a necessary imbalance in economic "fundamentals" an inconsistent policy regime. The model in Dooley (2000) is based on an alternative policy conflict between the holding of foreign exchange reserves as a form of self-insurance, and the yield differential relative to international returns generated by the availability of free insurance, which in turn generates a private gross capital inflow. When the government reserves are matched by its contingent insurance liabilities, the yield on domestic liabilities falls below its market rate, and investors sell their insured assets to the government exhausting its reserves. However, a crucial feature of this model is something that Dooley (2000) calls "appropriation", which is defined as "any activity that benefits the intermediary or its principle at the expense of the asset values."

As an example, Dooley (2000) cites governments instructing banks it owns or controls to lend to firms that do not earn the competitive rate of interest in order to promote exports or employment, or managers of a bank booking a loan at more than its market value and investing the difference offshore. Appropriation, as per Dooley's definition, seems to be describing special instances of government policy or corrupt practices that need not always be taking place. Furthermore, the model in Dooley (2000) is based on an unexpected increase in the government's net assets, and it is not clear why such a shock should necessarily arise.

Acharya and Krishnamurthy (2018) theoretically examine the role of reserves management and capital controls as ex-post and ex-ante safeguards, respectively, against sudden stops. They argue that, absent capital controls, the safeguard provided by reserves is partly undone by short term capital flows due to the moral hazard provided by reserves in the event of a sudden stop. They also analyze movements in external debt and reserves in India based on their model. In the period between June 2013 and October 2017, they show that higher liquidity provided by higher reserve accumulation vis-à-vis short term external debt is associated with more favorable emerging market asset price outcome.

Fatum and Yetman (2018) explore whether the accumulation of foreign reserves in 10 Asia-Pacific economies is systematically associated with risk-taking using an event study approach to examine responses to official announcements of reserve stocks. They find little evidence of reserve accumulation having a systematic impact on risk-taking, measured by implied volatility of out-of-the-money currency options, CDS spreads on sovereign US dollar-denominated bonds, and equity price indices. However, Sengupta (2010) finds an empirically robust correlation between foreign exchange reserve accumulation and dollar-denominated debt held on the balance sheets of 1500 non-financial firms from the six largest Latin American economies over the sample period, 1995–2007. Gabor (2010) discusses the implications of foreign exchange reserve accumulation as a result of sterilization of the capital inflows in 10 Eastern European economies. They argue that foreign exchange intervention served to increase the international attractiveness of domestic asset markets the Czech Republic

during 1994–96 before for short-term speculative activity, and exposed countries to greater international volatility. They also discuss the case of Romania in 2005, which is the inverse situation: capital inflows into Romania declined substantially within a month after the central bank announced that it would scale back its sterilization of capital inflows through foreign exchange intervention (Gabor, 2010). Similarly, Tong and Wei (2019) study the impact of foreign exchange reserve accumulation on corporate leverage in 6610 non-financial firms in 23 emerging market economies between 2000 and 2006, which is a source of corporate risk. They examine the hypothesis of whether the level of private-sector risk exposure increases to take advantage of a reduction of vulnerability to external shocks in response to a rise in foreign exchange reserve holding. They find that firms in countries that have a higher ratio of foreign exchange reserves to GDP have a higher leverage ratio. In light of these region specific, but contradictory results related to the research question in this chapter, further investigation is required.

2.2.2 Literature on Determinants of Capital Flows

The literature on capital flows hypothesizes that capital flows to wherever the returns to capital are the highest. In neoclassical theory, this would suggest that capital flows to wherever the marginal productivity of capital is the highest. Moreover, given the assumption of diminishing marginal product of capital, the relative average scarcity of capital in developing countries and emerging market economies, and the relative average abundance of capital in advanced countries, standard neoclassical theory predicts that capital should flow from advanced economies to developing and emerging market economies. Several studies show that, after 1970, net flows have been from developing countries to advanced economies (For example, Obstfeld and Taylor (2004); Gourinchas and Jeanne (2013)). This is known as the Lucas Paradox in the literature, and Lucas (1990) attributed the inconsistency with neoclassical theoretical predictions to differences in human capital and capital market imperfections. Gourinchas and Jeanne (2013) show that cross-country correlation between

productivity growth and net flows over the period 1980-2000 is negative, or at best, zero. Obstfeld and Taylor (2004) show that most capital flows are between rich countries and are therefore indicate "diversification finance" as opposed to "development finance."

Another explanation of capital flows follows directly from the condition of covered interest parity, which views capital flows as being driven by global asset market decisions. In the absence of capital market imperfections and impediments to capital mobility, capital will flow in order to exploit arbitrage opportunities: equilibrium is achieved when rate of return on assets in different countries is equalized. Covered interest parity assumes perfect asset substitutability, and therefore the only factor that drives capital flows is the rate of return. The Portfolio Balance Model, on the other hand, does not assume perfect asset substitutability, and argues the capital flows are driven by portfolio decisions of investors based on a variety of factors such as interest rate differential, expected change in exchange rates, and risk premium.

There is also a large and rich empirical literature on the determinants of capital flows. In general, the literature classifies the determinants of capital flows into supply-push factors and demand-pull factors. Supply or push factors refer to global determinants of capital flows, will demand or pull factors refer to country-specific factors that attract capital flows (Felices and Orskaug, 2008). The discussion of supply push factors has assumed importance in light of large co-movements of flows of capital, especially immediately preceding and during the recent global financial crisis. Rey (2015) shows that across countries capital flows to different regions have a strong common component, and that were negatively correlated with the Volatility Index (VIX) of the Chicago Board Options Exchange, which is taken as an indicator of global expectations. Capital flows are also shown to negatively correlated with the federal funds rate. Shin (2011) argues that global lending by banks depends on their balance sheet capacity, which in turn depends on the amount of bank capital and the degree of permitted leverage. Therefore, Shin suggests that cross-border banking and fluctuating leverage transmit permissive financial conditions globally. Moreover, several

regulatory changes allowed for the creation of permissive financial conditions. Bruno and Shin (2013) make a similar argument.

On the other hand, several studies emphasize the demand-pull factors of capital flows. Milesi-Ferretti and Tille (2011) argue that the collapse of capital flows during the financial crisis can be attributed to a collapse in investor confidence. However, the impact of this shock on a specific country depended on the extent and nature of international financial linkages, macroeconomic conditions, and dependence on world trade. Specifically, there was a capital retrenchment out of countries with large net external debt liabilities, and large exposure to liquidity risk. Portes and Rey (2005) argue that market size, efficiency of the transactions technology, and distance are important determinants of capital flows. Other studies emphasize the importance of more structural and institutional explanations of capital flows. Alfaro et al. (2007) argue that legal origins, and components of institutional quality such as investor protection, and macroeconomic policy plays an important role in determining capital flows and their volatility in the period 1970-2000. Similarly, Papaioannou (2009) argues that institutional underdevelopment such as the weak protection of property rights, legal insufficiency, and high risk of expropriation impedes flow of capital to developing countries.

Increasingly, several studies argue that these factors are not mutually exclusive, and both supply-push and demand-pull factors play a role in determining capital flows. Calvo et al. (1996) emphasize the importance of interest rates in developed countries, the external debt burden of developing countries, and creditworthiness of debtor countries in determining capital flows to developing countries. Ahmed and Zlate (2014) show that growth differentials, interest rate differentials, and global risk aversion are important drivers of capital flows to emerging market economies. The first two are demand-pull factor while global risk aversion is a supply-push factor. Felices and Orskaug (2008) use a joint estimation of demand and supply systems as both types of factors, push and pull, could be part of both demand and supply functions. They argue that supply of flows to emerging market economies depend

on interest rate spreads, sovereign credit ratings, global GDP growth, and US high-yield spreads. More recently, Ghosh et al. (2014) study the characteristics of surges in net capital flows between the period 1980–2011 for 56 emerging market economies, as they find that they have characteristics that are distinct from normal net capital flows. They find that global factors, such as the US interest rate and global risk (measured by volatility in S&P 500 index returns) play a role in determining the occurrence of surge episodes, as they are synchronized across countries and decades. However, whether an economy experiences a surge in net capital inflows also depends on its attraction as an investment destination. In particular, they find that external financing need (measured by current account deficit), financial openness, and exchange rate regime are correlated to the magnitude of net capital inflows in surge episodes. Barrot and Serven (2018) find that while gross capital flows exhibit considerable co-movement, there are differences in the degree of co-movement between countries and country groups. Their estimated common factors dominate capital flows in advanced economies, but local or idiosyncratic factors dominate capital flows in emerging economies. Additionally, they argue that the importance of global factors is also not stable over time, as common factors display an increasing importance in explaining the pattern of gross inflows and outflows of capital until 2008, after which the effect of common factors exhibit a decline. Interestingly, they also find that the exposure of countries to global cycles is related to their policy framework, as some factors like financial openness amplify the effects of the global cyclical factors on gross flows in a particular country. Clearly, several country-specific factors play a role in determining capital flows, and credit worthiness and risk assessment is an important determinant. In this regard, the role played by reserves in improving credit worthiness, and thereby encouraging capital flows, has not been assessed in the literature.

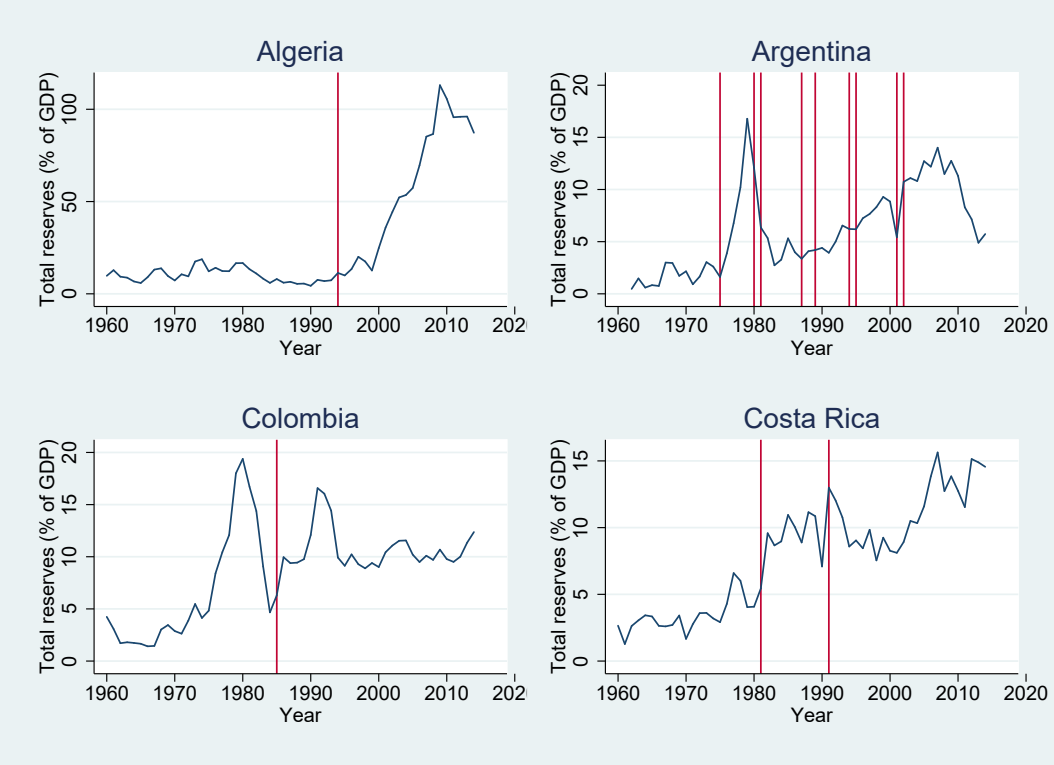
2.2.3 Literature on Early Warning Systems for Currency Crises

The literature on early warning systems and prediction, and currency crises in particular, is also insightful. While there are several studies that explore the best predictors of crises, Kaminsky et al. (1998), Hawkins and Klau (2000), and Frankel and Saravelos (2010) provide comprehensive surveys of this literature. Kaminsky et al. (1998) examine the existing evidence on currency crises by reviewing 28 theoretical and empirical studies on currency crises till 1997, and propose an early warning system for currency crises. They find that individual variables that are consistently found to be useful indicators of currency crises are international reserves, real exchange rate, credit growth, credit to the public sector, and domestic inflation. Hawkins and Klau (2000), on the other hand, only find that short-term debt to foreign exchange reserves as an important predictor of crises under some conditions. Frankel and Saravelos (2010) review 83 studies in this literature, based on which they conduct an empirical investigation into country vulnerability to crises during 2008–09. They find that foreign exchange reserves, the real exchange rate, the growth of credit, GDP, and the current account are the most frequently statistically significant indicators in the literature surveyed. Moreover, of these and other indicators, they find that the level of reserves stood out as a key leading indicator of crisis incidence during 2008–09.

It is important to note here that in this literature, it appears that a *decline* in reserve holdings is taken as an indicator of crisis incidence, in contrast to the relationship being posited in this chapter. However, there are reasons to be suspicious of this result. Even though there is variation in the definition of crisis in the early warning system literature, most of them use an exchange rate pressure index, which is a composite of exchange rate, interest rates, and international reserves. Therefore, international reserves figure among both the dependent and independent variables in several studies in the early warning system indicators. Even though the indices and explanatory variables used are usually not contemporaneous in the econometric models, there is reason to suspect a bias in the results. Moreover, the tendency that this chapter posits is likely to not be observed immediately before a crisis, as in that

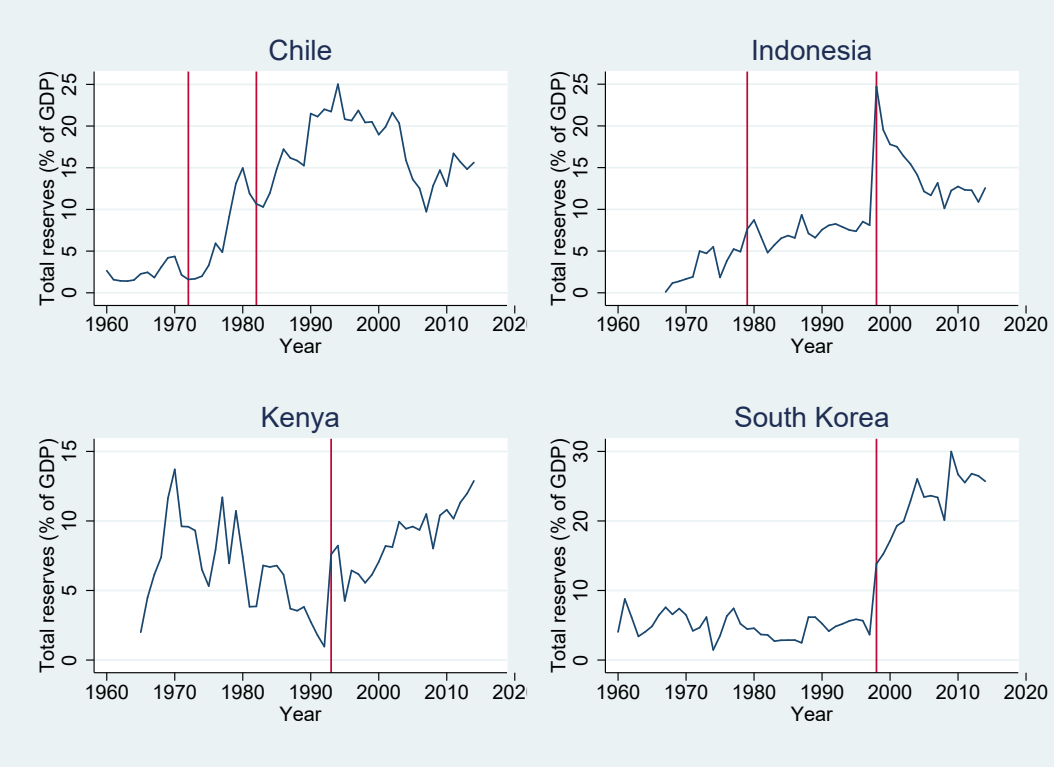
period, central banks spring into operation in an attempt to prevent the crises. This is likely to take the form of decumulation of reserves. Figures 2.1 through 2.4 show the trend in reserves as a share of GDP for some selected developing economies over time. In these figures, the vertical red line marks the year of a currency crisis. In several instances, there is a sharp decline in reserves as a share of GDP immediately preceding a currency crisis. However, in several instances, there is also a sharp increase in reserves as a share of GDP immediately preceding the sharp decline before the currency crisis. Figure 2.5 shows that this is also observed in advanced economies. Therefore, a more careful investigation into the role of reserves in the period leading up to a financial crisis is warranted.

Figure 2.1: Trends in Foreign Exchange Intervention and Crisis in Selected Developing Economies



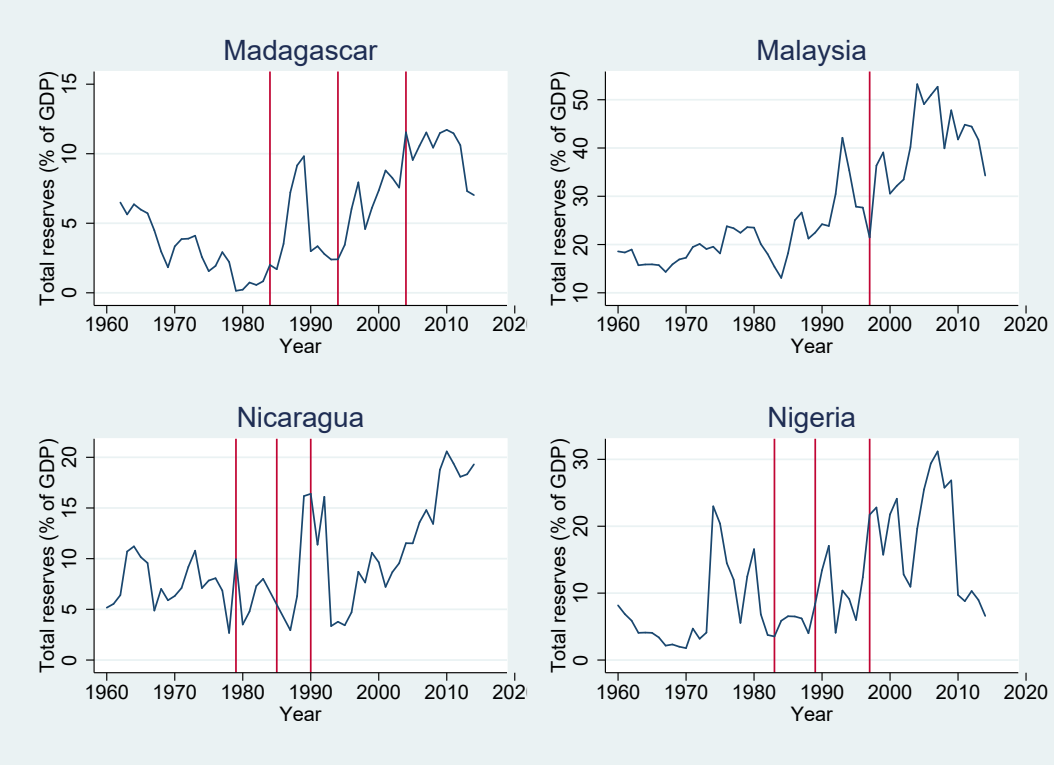
Red line marks the year of a currency crisis
Source: Author's Calculations

Figure 2.2: Trends in Foreign Exchange Intervention and Crisis in Selected Developing Economies



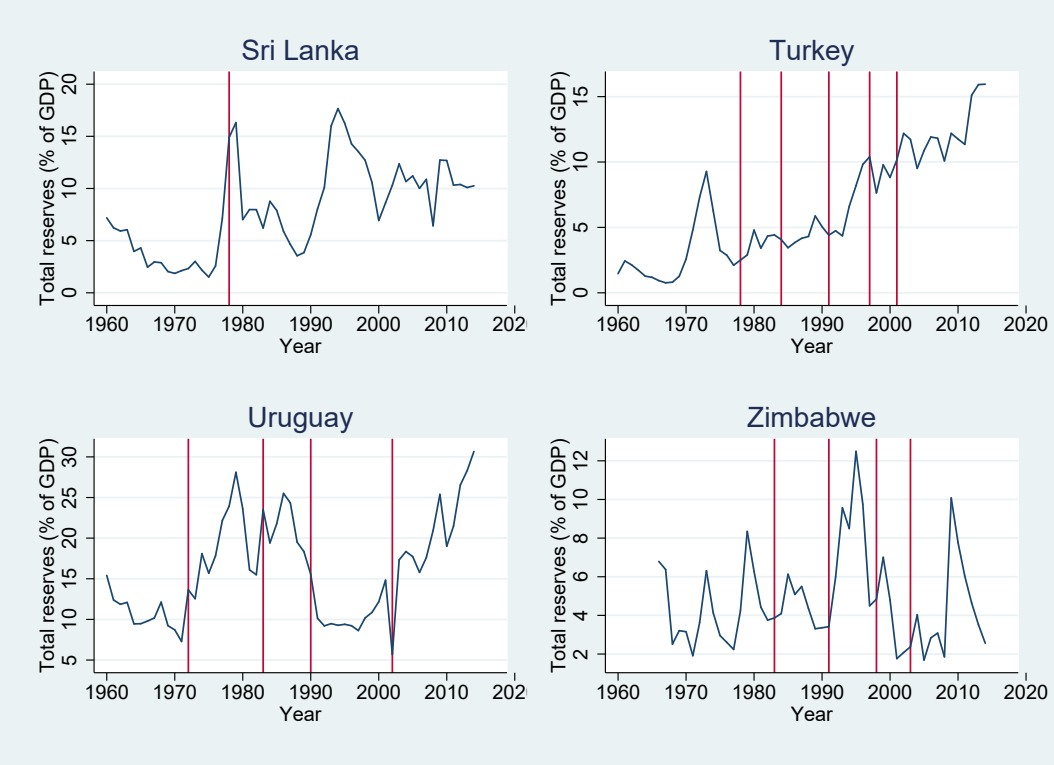
Red line marks the year of a currency crisis
Source: Author's Calculations

Figure 2.3: Trends in Foreign Exchange Intervention and Crisis in Selected Developing Economies



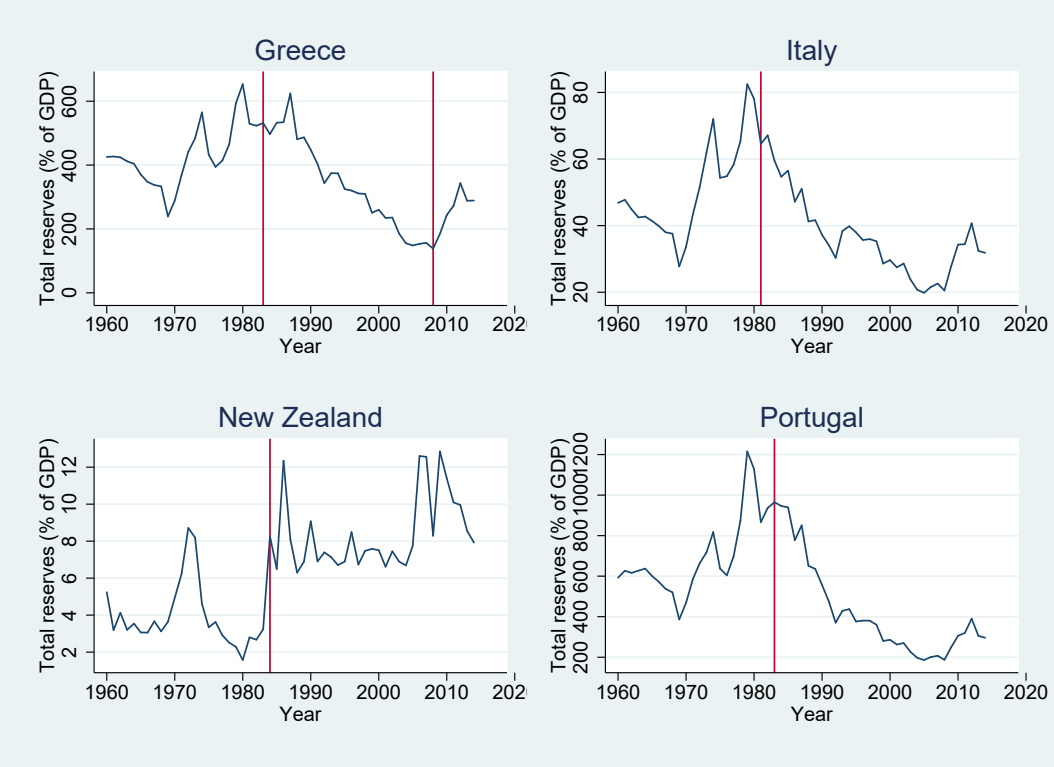
Red line marks the year of a currency crisis
Source: Author's Calculations

Figure 2.4: Trends in Foreign Exchange Intervention and Crisis in Selected Developing Economies



Red line marks the year of a currency crisis
Source: Author's Calculations

Figure 2.5: Trends in Foreign Exchange Intervention and Crisis in Selected Advanced Economies



Red line marks the year of a currency crisis
Source: Author's Calculations

2.3 Central Hypothesis

The hypothesis of this chapter is that reserve holdings may be imposing an additional indirect cost on countries in which Central Banks hold a large quantity of foreign exchange reserves, based on the following dynamic:

1) Central banks accumulate foreign exchange reserves to protect against currency/sovereign debt/financial crises

2) Accumulation of foreign exchange reserves reduces the probability of a currency/sovereign debt/financial crises

3) Reduced probability of crisis makes investment in country less risky, ceterus paribus

4) Reduced perception of risk encourages gross inflow of capital into an economy

5) Increased gross flow of capital into an economy increases likelihood of currency/sovereign debt/financial crises

Therefore, even though central bank reserve holdings are meant to act as a buffer against the effects of volatile capital flows, they may contribute to creating the situation they are meant to prevent by creating moral hazard for foreign lenders. This is because with the accumulation of foreign exchange reserves with the central banks through foreign exchange intervention increases their ability to bail out the domestic borrowers borrowing from international lenders in foreign currency. In other words, it affords central banks the space to act as a lender of last resort in instances in which the assets at the risk of default are denominated in a currency other than the one that it issues. An expectation of bailout is reasonable, even without an explicit promise of bailout. As argued by Corsetti et al. (1999),

> *...no ex-ante announcement by policy makers can convince the public that ex-post (that in the midst of a generalized financial turmoil) the government would cross its arms and let the financial system proceed towards its debacle.* (Corsetti et al., 1999)

Even the use of these reserves to stabilize the currency in the wake of a generalized outflow of capital from the economy guarantees, to a certain extent, an exchange rate within a certain range for the first lenders out of the door, maintaining the feasibility of returns on their investment for foreign lenders. This safety afforded by the accumulation of reserves on the margin can conceivably encourage further capital inflows into the economy. Since the volume of lending or capital flows have implications for financial stability, determining whether high reserve accumulation encourages a higher volume of lending is important.

This chapter tests this hypothesis by examining the relationship between reserve accumulation, gross capital inflows, net capital inflows, and the occurrence of crises. Specifically,

it explores whether high reserve accumulation leads to higher capital inflows in an economy and financial crises, accounting for other determinants of capital flows.

2.4 Data

The dataset used in this study has been constructed using several publicly available sources. The main source of data is the International Financial Statistics and the Global Debt Database of the International Monetary Fund. This has been supplemented with other datasets whenever needed.

The key dependent variables used in this study are gross capital inflows, gross capital outflows, net capital inflows, and crisis variables.

2.4.1 Capital Flows

Data on capital flows is obtained from the IMF International Financial Statistics. However, the coverage of data is better in the dataset constructed in Lane and Milesi-Ferreti (2017). Gross capital inflows are defined as the change in total liabilities for each country, and gross capital outflows are defined as the change in total assets for each country. Therefore, data on gross and net capital flows are the same as those used in Lane and Milesi-Ferreti (2017). Lane and Milesi-Ferreti (2017) supplement the data on the international investment position of economies in the International Financial Statistics from country reports, and bilateral data on portfolio, foreign direct investment, and bank holdings, allowing for better data availability. Capital inflows measure net purchases or sale by nonresidents of domestic assets, and capital outflows measure net purchases or sale of foreign assets by residents. Data is denominated current US Dollars, which is then scaled by Nominal GDP measured in current US Dollars, and converted to natural logarithmic form.

2.4.2 Crisis Data

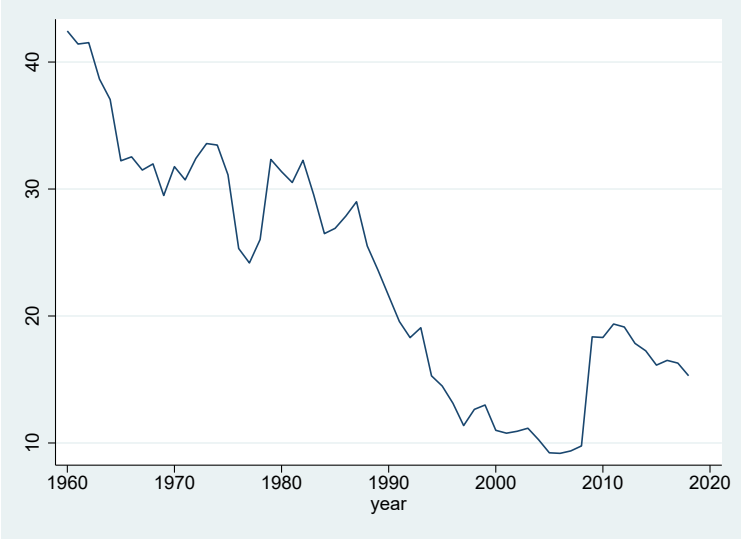
This chapter draws on the work of Laeven and Valencia (2018) for defining crisis variables. For the period 1970–2017, Laeven and Valencia (2018) identify three types of crises: systemic

banking crisis, currency crisis, and sovereign debt crises. In the case of the first two types of crises, this dataset identifies the first year of the crises, while in the case of a sovereign debt crisis, the dataset records the year of a sovereign default. We define four variables *sb*, *cc*, and *sd*, which take a value of 1 for the country-year of a systemic banking crisis, currency crisis, and sovereign default, respectively, and zero otherwise.

2.4.3 Foreign Exchange Reserves

The key independent variable, on the other hand, used in the study is foreign exchange reserves accumulated by central banks, both including and excluding gold reserves. In general, since the key role played by reserves posited in this chapter is the provision of immediate international liquidity, foreign exchange reserves should be considered excluding gold reserves. This assumption is supported by Figure 2.6, which shows that a decreasing proportion of foreign exchange reserves are held in the form of gold.

Figure 2.6: Proportion of Gold, % of Total Reserves



Source: Author's calculations

Data on Foreign exchange reserves are obtained from the International Financial Statistics, and supplemented by the dataset in Lane and Milesi-Ferreti (2017). Reserves are scaled

by the GDP in order to facilitate comparison across countries and over time, and converted to natural logarithmic form.

2.4.4 Country Classification

In this chapter, the World-Bank income classifications are used in order to classify countries into *High Income* countries, *Upper-Middle Income* countries, *Lower-Middle* Income countries, and *Low-Income* countries. Countries in the *Upper-Middle Income*, *Lower-Middle Income*, and *Low-Income* country categories are classified as *Developing* countries, while *High-Income* countries are classified as *Advanced* countries. We obtained the historical classification of countries, which takes into account how countries have moved from one country group to another. However, since there is not much movement of countries between country groups, specifically from the *Developing* country classification to *Advanced* country classification, we have used the classification of countries as it stands in 2017.

It is questionable whether per-capita income (on which the World Bank income classifications are based) adequately characterizes the level of development. Therefore, we also have data on the World Bank classification of countries into operational lending categories of International Development Association (*IDA*), which includes countries that do not have the financial ability to borrow from the International Bank of Reconstruction and Development, countries that can borrow from the International Bank of Reconstruction and Development (*IBRD*), and *Blend*, which includes countries that are eligible for both *IDA* and *IBRD* loans. Based on this classification, we classify any of the countries in *IDA*, *IBRD*, and *Blend* groups into the *Developing by Lending* country category, and all other countries in the *Advanced by Lending* country category. This classification is used to check the robustness of our results.

The full list of countries in all the categories mentioned that are used in the analysis in this chapter are mentioned in the Appendix.

2.4.5 Control Variables

In addition to these key variables, several other control variables are also included in this study. In general, we want to control for other factors that are found in the literature to have an impact on determining capital inflows. As in Ghosh et al. (2014), we classify the control variables into push and pull factors. The push, or global, factors used as control variables are the volatility in S&P 500 returns[1] and the global commodity price index. The pull, or country-specific, factors that are controlled for include n=log real GDP per capita, log real GDP growth rate, log of the current account as share of GDP, de jure capital account openness (measured by the Chinn-Ito index), interest rate on domestic government treasury bills, and the exchange rate regime. A full list of variables and sources are listed in the Appendix A.

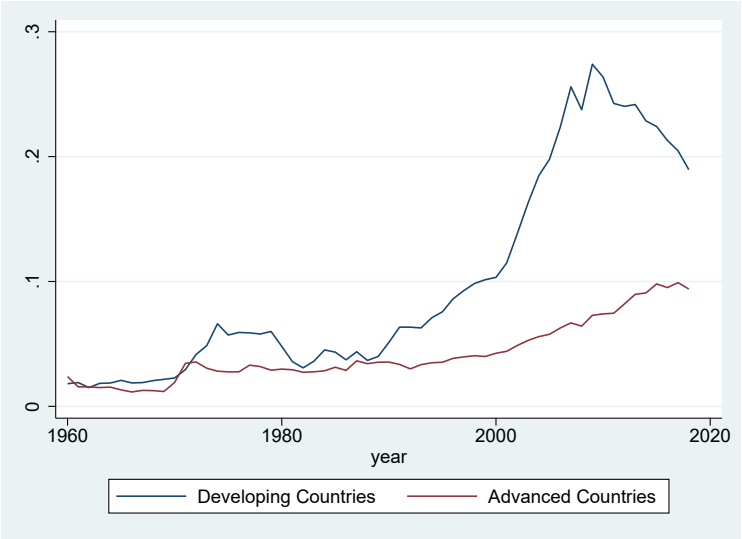
2.5 Descriptive Statistics

In the period under consideration, the reserve accumulation as a result of foreign exchange intervention has increased to unprecedented levels, especially towards the end of the last decade. This trend is specifically marked in Developing Economies as compared to Advanced Economies, as can be seen in Figure 2.7

During the same period, the trends in gross capital inflows and outflows can be seen in Figure 2.8. Interestingly, while there is not an immediately apparent trend in capital and capital outflows, it is evident that positive inflows and outflows are much higher in advanced economies than in developing economies. However, in comparison, while foreign exchange reserve holdings is increasing in both country groups, it is higher in developing economies. Additionally, there is a marked coordinated increase in foreign exchange reserve accumulation

[1]We use this as opposed to the more traditionally used Volatility Index or VIX of the the Chicago Board Options Exchange (CBOE) as data on VIX is only available since 1990. VIX is calculated as "30-day expected volatility of the U.S. stock market, derived from real-time, mid-quote prices of S&P 500 Index call and put options." In comparison, our measure is a rolling standard deviation of closing values of the daily S&P 500 Index for each year.

Figure 2.7: Trend in Foreign Exchange Reserves (share of GDP), 1970–2017

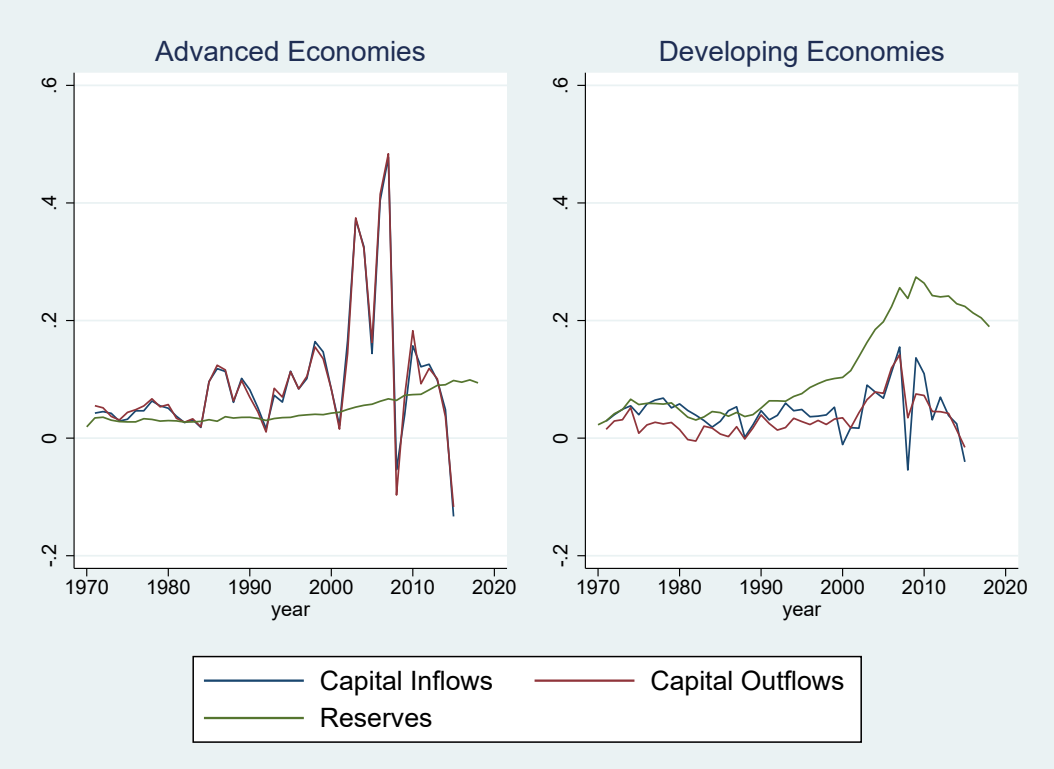


Source: Author's Calculations

in both country groups, when there is also a marked increase in capital inflows. This is also seen in the trends in the change in reserve accumulation as can be seen in Figure 2.9.

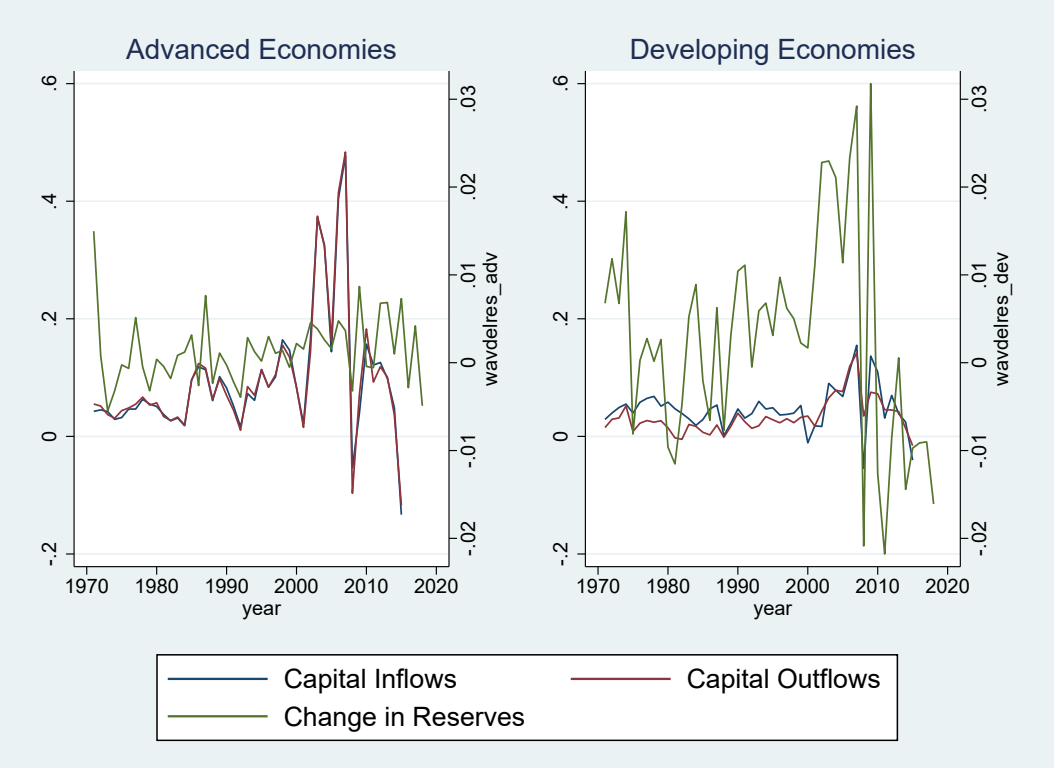
The trend in external debt in both country groups are shown in Figure 2.10. It shows the increase in foreign exchange reserve accumulation, has happened despite the decline in the total stock of external debt in both country groups since the mid-2000s, followed by a modest recovery since 2009. Furthermore, while the level of external debt as a share of GDP was much higher in advanced economies in the advanced economies, the level of external debt as a share of GDP in advanced economies after the global financial crisis is comparable to that in developing economies. Of the total external debt, short term external debt as a share of GDP has also declined in advanced economies. However, short term external debt has recovered in developing economies, while this is not the case in advanced economies. This trend is significant for our hypothesis, especially in light of the high levels of reserve accumulation in developing economies as compared to that in advanced economies, as is shown in Figure 2.7.

Figure 2.8: Trend in Capital Inflows, Outflows, FX Reserves (share of GDP), 1970–2017



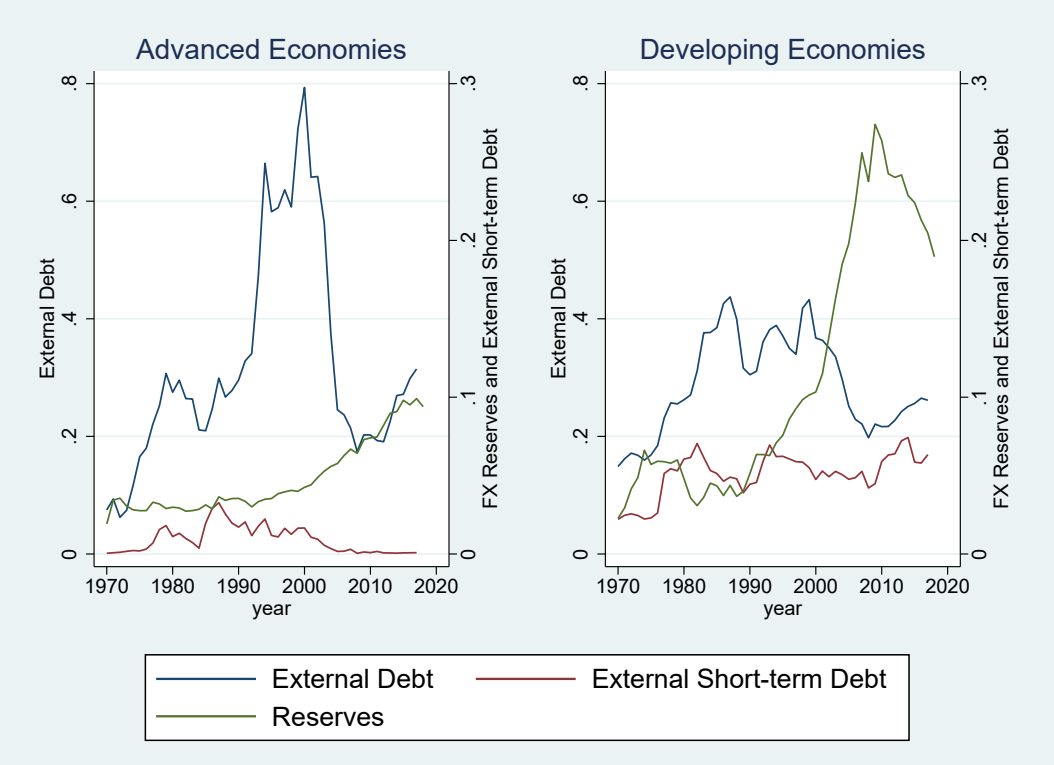
Source: Author's Calculations

Figure 2.9: Trend in Capital Inflows, Outflows, Change in FX Reserves (share of GDP), 1970–2017



Source: Author's Calculations

Figure 2.10: Trend in Total and Short-term External Debt, and FX Reserves (share of GDP), 1970–2017



Source: Author's Calculations

Table 2.1 summarizes the trends in Reserves as a share of GDP, Gross Capital inflows as a share of GDP, Net Capital Inflows as a share of GDP, External Debt as a share of GDP, and Short-term External Debt as a share of GDP by decade. The summary statistics are weighted by real GDP. It is interesting to note that net capital inflows are, on average, much smaller than the gross capital inflows. Furthermore, the average trends in gross capital inflows are not mirrored in the trends in net capital inflows. Therefore, a closer look at both gross and net capital inflows is warranted.

Table 2.1: Mean, Standard Deviation, and Median of key variables by decade

		1970-1979	1980-1989	1990-1999	2000-2009	2010-2018
Reserves	Mean	0.020	0.024	0.029	0.060	0.079
	SD	0.023	0.022	0.039	0.98	0.129
	Median	0.011	0.021	0.019	0.015	0.015
Gross Inflows	Mean	0.044	0.060	0.101	0.189	0.062
	SD	0.043	0.061	0.197	0.717	0.528
	Median	0.029	0.049	0.082	0.107	0.056
Net Inflows	Mean	0.0001	-0.0001	0.0002	0.0002	0.0006
	SD	0.0006	0.0006	0.0024	0.0031	0.0063
	Median	0.0000	0.0000	-0.00003	-0.00001	-0.0000
External Debt	Mean	0.080	0.076	0.343	0.274	0.293
	SD	0.066	0.095	0.267	0.128	0.127
	Median	0.120	0.111	0.197	0.229	0.265
Short-term Debt	Mean	0.003	0.007	0.060	0.047	0.058
	SD	0.002	0.008	0.044	0.034	0.035
	Median	0.004	0.007	0.062	0.037	0.048

2.6 Methodology and Results

In order to determine the impact of the high levels of reserves on capital inflows into an economy and crisis, we examine the correlations between reserves accumulated as a share of GDP with the inflows of capital. There are a host of endogeneity concerns that the analysis has to contend with. Given that high levels of capital inflows are likely to also facilitate foreign exchange intervention that leads to accumulation of foreign exchange reserves, there is a serious concern of reverse causation. In order to address these concerns as we conduct

our analysis, we use dynamic panel data methods. The data has been analyzed using the STATA 16 software.

The key variables in the analysis are likely to exhibit persistence over time, that is, there is likely to be serially autocorrelated. This is true for capital inflows, reserves, and change in reserves. When we check for serial autocorrelation in the panel using Wooldridge's test for panel serial autocorrelation, we can reject the null hypothesis of no serial autocorrelation[2]. Furthermore, reserves as a share of GDP is likely to be an endogenous variable and capital inflows and reserves are likely to be highly correlated: it would not be surprising if reserve accumulation if higher with higher capital inflows. Therefore, in order to examine the effects of reserves accumulation on capital inflows, we cannot use contemporaneous values of reserves. We use lagged values of the stock of foreign exchange reserves accumulated through foreign exchange intervention. In order to account for this, we estimate a Difference GMM model.

$$y_{it} = X_{it}\beta_1 + Z_{it}\beta_2 + \alpha_i + u_{it}$$

where $t = 1, 2, ..., T$, $i = 1, 2, ..., n$, y_{it} is the dependent variable, X_{it} is the $1 \times k$ vector of independent variables, Z_{it} is the vector of control variables. This is estimated by taking the first difference of this equation (thereby getting rid of the country fixed effects) and estimating the Arellano-Bond estimator using the Generalized Methods of Moments. They key independent variable used is the lagged values of the reserves to GDP ratio. We use five lags of the reserves to GDP ratio as the independent variable. Additionally, in our difference GMM estimation, we also use the five lags of the dependent variable as independent variables. Countries that have continued to increase their reserves year-over-year are also considered distinctly. Specifically, we define a binary variable *consistent* that takes the value 1 if there has been a consistent increase in reserves for five consecutive preceding years, and

[2]The F-statistic for Wooldridge test for autocorrelation in panel data is 8.7557, at which we can reject the null hypothesis of no first-order autocorrelation. This is obtained in STATA using the *xtserial* command

zero otherwise. In addition, we also estimate a simple Fixed Effects model, with country and year fixed effects, system GMM model, to examine the robustness of our results across specifications. In order to preserve efficiency, we limit the number of lags used as instruments in our difference and system GMM estimation to five.

We also estimate the system GMM model with an external instrumental variable. In their examination of the lessons from the Global Financial Crises for the management of capital accounts in emerging market economies, Gabor (2012) highlights the importance of the internationalization of banking activity and the degree of foreign ownership in the banking system in determining the appropriate level of foreign exchange reserves a central bank should ideally hold. Specifically, the presence of a high degree of foreign ownership of banks eases access to short-term borrowing in the international inter-bank market (Gabor, 2010), and their presence can better transmit external shocks to the domestic economy without necessarily increasing domestic access to credit Cull et al. (2017). This increased vulnerability to external shocks would require the accumulation of a higher level of foreign exchange reserves in order for foreign exchange reserves to mitigate the risk of capital flight, but their presence may not necessarily increase the inflow of foreign capital into the economy. Therefore, we use the presence of foreign-owned banks in an economy as an instrumental variable in our analysis.

We obtain data on cross-border claims on the residents of a country by Bureau of International Settlements banks available through the BIS Locational Banking Statistics by country. We scale the data by the GDP of the country to obtain the share of cross-border claims of banks on residents as a share of GDP, which is then used as an instrumental variable [3].

Table 2.2 shows the results from our Dynamic Panel Data analyses. The different columns reports the coefficients for our different estimators, using both push and pull factors as control

[3]While we would ideally like to use the share of foreign ownership of banks in an economy as our instrument, the publicly available data from the World Bank Banking Regulation and Supervision Survey does not have sufficient coverage for our purposes.

variables. Interestingly, across all specifications, the coefficient on the first lag is positive (and significant in columns 2, 3, and 4). These coefficients suggest a 1 percent increase in reserves to GDP ratio is associated with a 0.006–0.046 percent increase in gross capital inflows as a share of GDP. The coefficients on the second lag and third lag are all negative (except for third lag in columns 3 and 4), but insignificant. The coefficients on the fifth lag are consistently positive and significant across specifications, except for in Column 4. These results suggest that a 1 percent increase in reserves to GDP ratio is associated with a 0.006–0.011 percent increase in gross capital inflows as a share of GDP in five years. However, these results are tempered by the consistently negative coefficients on the fourth lag of our reserves variable, and statistically significant in Columns 1, 3, and 4.

The coefficients on the current account variable are negative and significant in Columns 1 and 2. This is consistent with the result in Ghosh et al. (2014): higher gross capital inflows are associated with a current account deficit, implying that an economy's total financing need is associated with higher gross capital inflow. It is also important to note that the coefficient on the Chinn-Ito index is positive and significant in columns 2 and 4, providing some evidence that countries with greater capital account openness also experience greater gross capital inflows.

We conduct the same analysis for Net Capital Flows, to see if the patters on gross inflows can also be seen in net inflows as a share of GDP [4]. The results are shown in Table 2.3. The coefficients on the first lag of reserves to GDP are positive and significantly related to net capital inflows in column 2. The coefficients on the second and third lag are consistently negative, but not statistically significant. The coefficients on the fourth lag are all consistently positive, but not statistically significant. The coefficients on the fifth lag do not display a consistent sign across specifications and are not statistically significant either.

[4]We exclude the current account control variable as it is tautologically related to net capital flows, as shown in Equation 2.1.

Table 2.2: Dynamic Panel Regression results for Gross Capital Inflows

	(1) Fixed Effects	(2) Difference GMM	(3) System GMM	(4) System GMM w/ IV
l1.logreserves	0.005	0.006**	0.046*	0.046*
	(0.004)	(0.003)	(0.025)	(0.025)
l2.logreserves	-0.002	-0.002	-0.001	-0.002
	(0.003)	(0.003)	(0.002)	(0.002)
l3.logreserves	-0.002	-0.001	0.004	0.003
	(0.005)	(0.003)	(0.003)	(0.002)
l4.logreserves	-0.005**	-0.005	-0.007*	-0.007*
	(0.002)	(0.003)	(0.004)	(0.004)
l5.logreserves	0.006*	0.008***	0.010**	0.011**
	(0.004)	(0.003)	(0.005)	(0.005)
Consistent	0.002	0.000	0.004	0.006
	(0.002)	(0.004)	(0.006)	(0.006)
Volatility	-0.017**	0.002	0.002	0.002
	(0.007)	(0.001)	(0.003)	(0.003)
Commodity Index	0.000**	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Current Account	-0.073**	-0.108**	0.216	0.196
	(0.032)	(0.047)	(0.185)	(0.185)
Per-capita Income	0.024**	0.010	0.015	-0.017
	(0.011)	(0.010)	(0.031)	(0.025)
GDP growth	0.036	0.011	-0.053	-0.081
	(0.029)	(0.017)	(0.053)	(0.059)
Chinn-Ito Index	0.014	0.016**	0.023	0.036
	(0.009)	(0.007)	(0.043)	(0.031)
Interest Rate	0.001**	0.001	-0.001	-0.002
	(0.000)	(0.000)	(0.002)	(0.001)
Exchange Rate	-0.002	-0.008**	-0.059*	-0.043*
	(0.002)	(0.003)	(0.033)	(0.024)
ER Regime	-0.001	-0.001	0.031	0.027
	(0.001)	(0.002)	(0.021)	(0.020)
Constant	2.940***	4.010***	3.573***	3.963***
	(0.218)	(0.307)	(0.387)	(0.368)
N	1085	1009	1089	1045

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the Fixed Effects Model, five lags of the dependent variable are included as control variables.

Table 2.3: Dynamic Panel Regression results for Net Capital Inflows

	(1)	(2)	(3)	(4)
	Fixed Effects	Difference GMM	System GMM	System GMM w/ IV
l1.logreserves	0.0132	0.0178***	-0.0174	-0.0156
	(0.0087)	(0.0047)	(0.0208)	(0.0194)
l2.logreserves	-0.0076	-0.0073	-0.0014	-0.0009
	(0.0065)	(0.0060)	(0.0069)	(0.0073)
l3.logreserves	-0.0109	-0.0087	-0.0117	-0.0125
	(0.0118)	(0.0060)	(0.0082)	(0.0081)
l4.logreserves	0.0091	0.0067	0.0164	0.0162
	(0.0152)	(0.0059)	(0.0123)	(0.0123)
l5.logreserves	0.0010	0.0018	-0.0061	-0.0058
	(0.0086)	(0.0048)	(0.0062)	(0.0062)
Consistent	0.0030	0.0034	-0.0048	-0.0050
	(0.0049)	(0.0060)	(0.0069)	(0.0066)
Volatility	-0.0085	-0.0042*		-0.0010
	(0.0170)	(0.0024)		(0.0028)
Commodity Index	0.0003	0.0002***	0.0002	0.0001
	(0.0003)	(0.0000)	(0.0001)	(0.0001)
Per-capita Income	-0.0471	-0.0155	-0.0053	0.0251
	(0.0383)	(0.0165)	(0.0532)	(0.0239)
GDP Growth	0.0512	-0.0081	0.0229	0.0417
	(0.0484)	(0.0304)	(0.0376)	(0.0451)
Chinn-Ito Index	0.0421	0.0626***	-0.0473	-0.0477
	(0.0257)	(0.0131)	(0.0545)	(0.0571)
Interest Rate	-0.0007	0.0003	0.0014	0.0012
	(0.0009)	(0.0007)	(0.0018)	(0.0016)
Exchange Rate	0.0250	0.0348***	0.0379*	0.0187
	(0.0158)	(0.0084)	(0.0214)	(0.0164)
ER Regime	0.0004	-0.0001	-0.0032	-0.0014
	(0.0034)	(0.0031)	(0.0115)	(0.0101)
Constant	-0.8255	-0.8398***	-1.8680***	-2.1729***
	(0.5570)	(0.2208)	(0.5529)	(0.3740)
N	980	902	1040	1013

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the Fixed Effects Model, five lags of the dependent variables are used as control variables

We estimate these models for external debt as a share of GDP and external short-term debt as a share of GDP, but we do not find a relationship that is statistically significant across any lags of the reserves to GDP ratio, and is not reported.

2.6.1 Relatively High Reserve Accumulation

Since the relationship between capital inflow and reserves is posited in this chapter is one of creating moral hazard for international lenders, the volume of reserves held by a central bank relative to other central banks are likely to be a more relevant determinant of the volume of capital flows received by a country rather than the absolute volume of foreign exchange reserves held in a country by a central bank relative to its GDP. Therefore, we examine the role played by the holding of FX reserves in countries relative to all other countries in a given year. In order to do this, we determine the location of a country's reserve accumulation in the distribution of reserve accumulation in a given year. We still consider distribution of the foreign exchange reserves relative to GDP since the size of the economy would determine whether the reserve holdings of a Central Banks are sizeable in the economy under consideration.

Therefore, instead of considering reserves as a share of GDP as the independent variable, we calculate the standard score of the reserves holdings of a country in a given year, that is, we calculate the number of standard deviations away the foreign exchange reserve holding of a country is from the average foreign exchange reserve holding in any year. We estimate our model using the lagged values of the foreign exchange reserves standard score in order to answer the question: is a relatively higher accumulation of foreign exchange reserves causally related to higher capital inflows into an economy. The results are shown in Table 2.4.

Interestingly, in Table 2.4, the coefficient on the first lag is positive in all four specifications, and significant in three of those. Furthermore, the coefficients on the fifth lag are also positive in all of our specification and statistically significant in all but the fixed effects model. The coefficients on our other lags are mixed, with some being positive and some

Table 2.4: Impact of Relative Reserve Accumulation on Gross Capital Inflow

	(1) Fixed Effects	(2) Difference GMM	(3) System GMM	(4) System GMM w/ IV
l1.$Z_{reserves}$	0.012	0.013*	0.161*	0.143*
	(0.015)	(0.007)	(0.087)	(0.084)
l2.$Z_{reserves}$	0.002	0.002	0.001	-0.013
	(0.013)	(0.009)	(0.012)	(0.010)
l3.$Z_{reserves}$	-0.009	-0.008	0.002	-0.000
	(0.015)	(0.009)	(0.013)	(0.013)
l4.$Z_{reserves}$	-0.013	-0.013	-0.002	-0.004
	(0.011)	(0.009)	(0.016)	(0.014)
l5.$Z_{reserves}$	0.020	0.027***	0.032**	0.037**
	(0.014)	(0.007)	(0.016)	(0.015)
Volatility	-0.015**	0.002	0.005	0.003
	(0.007)	(0.001)	(0.004)	(0.003)
Commodity Index	0.000**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Current Account	-0.077**	-0.119**	0.358	0.231
	(0.033)	(0.046)	(0.228)	(0.177)
Per-capita Income	0.021	0.009	0.044	-0.006
	(0.013)	(0.010)	(0.029)	(0.018)
GDP growth	0.037	0.008	-0.043	-0.076
	(0.028)	(0.017)	(0.055)	(0.058)
Chinn-Ito Index	0.014	0.014*	0.003	0.020
	(0.009)	(0.007)	(0.044)	(0.027)
Interest Rate	0.001**	0.000	-0.001	-0.002
	(0.000)	(0.000)	(0.002)	(0.001)
Exchange Rate	-0.002	-0.007**	-0.051*	-0.028
	(0.002)	(0.003)	(0.028)	(0.019)
ER Regime	-0.001	-0.001	0.025	0.018
	(0.001)	(0.002)	(0.018)	(0.016)
Constant	2.938***	4.123***	3.014***	3.683***
	(0.188)	(0.307)	(0.367)	(0.303)
N	1085	1009	1089	1045

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the Fixed Effects model, five lags of the dependent variable are also used as controls

being negative. However, none of these coefficients are statistically significant. Our result provide evidence that higher reserve accumulation as compared to other countries in a given year is associated with higher gross capital inflows within within one year and within five years.

We also calculate the standard score of the gross capital inflows and net capital inflows received by a country in every year. We then ask: is it the case that a higher reserve accumulation relative to other countries is associated with higher gross capital inflow relative to other countries in a year? Table 2.5 shows the results for this investigation. Notably, the results in this table are consistent with those in Table 2.4: the first and fifth lag of the standard score of reserves as a share of GDP are positively and significantly associated with a higher standard score of gross capital inflows as a share of GDP.

We conduct a similar analysis for net flows, that is, we analyze whether relatively higher reserves as a share of GDP is causally related with relatively higher net capital inflows. Unlike the results for gross capital inflows, we do not find similar, systematic, and robust results for net capital inflows. The regression results for net capital inflows and standard score for the net capital inflows are available in Table B.4 and Table B.5, respectively, in Appendix C.

2.6.2 Quantile-specific effects

It may be the case that higher levels of reserve accumulation have a qualitatively different impact on capital inflows than lower levels of reserve accumulation, and are not simply scaled up impacts as those compared to lower levels of reserve accumulation. If this is the case, a difference GMM analysis may not be sufficient, and we need a panel data quantile regression approach. Therefore, we estimate a panel quantile data regression model with fixed effects for each quantile, with five lags of the reserves to GDP ratio[5]. Table 2.6 shows the results

[5]This model has been estimated using *qregpd* STATA module using the Markov Chain Monte Carlo optimization

Table 2.5: Impact of Relative Reserve Accumulation on Relative Gross Capital Inflow

	(1) Fixed Effects	(2) Difference GMM	(3) System GMM	(4) System GMM w/ IV
l1.$Z_{reserves}$	0.440	0.373**	2.968*	3.666
	(0.416)	(0.165)	(1.626)	(2.313)
l2.$Z_{reserves}$	-0.108	-0.113	-0.008	-0.378
	(0.343)	(0.214)	(0.278)	(0.301)
l3.$Z_{reserves}$	-0.124	-0.005	0.261	0.154
	(0.434)	(0.217)	(0.302)	(0.278)
l4.$Z_{reserves}$	-0.433	-0.442**	-0.035	0.028
	(0.425)	(0.220)	(0.309)	(0.366)
l5.$Z_{reserves}$	0.529*	0.609***	0.644*	0.881**
	(0.315)	(0.177)	(0.386)	(0.425)
Volatility	-0.419	0.056*	0.099	0.088
	(0.264)	(0.032)	(0.067)	(0.079)
Commodity Index	0.008	0.000	0.002	0.002
	(0.005)	(0.001)	(0.002)	(0.002)
Current Account	-1.779**	-2.428**	6.648	7.835
	(0.837)	(1.093)	(4.582)	(5.947)
Per-capita Income	0.362	0.075	0.105	0.089
	(0.279)	(0.235)	(0.597)	(0.417)
GDP growth	1.042	0.574	-0.426	-1.046
	(0.804)	(0.403)	(0.734)	(1.017)
Chinn-Ito Index	0.227	0.218	0.848	1.332
	(0.227)	(0.169)	(1.487)	(0.954)
Interest Rate	0.009	0.015	-0.012	-0.018
	(0.006)	(0.010)	(0.030)	(0.033)
Exchange Rate	-0.015	-0.081	-0.425	-0.276
	(0.039)	(0.073)	(0.344)	(0.317)
ER Regime	0.001	0.000	0.265	0.282
	(0.017)	(0.043)	(0.222)	(0.304)
Constant	-20.107***	-1.232	-5.283	-4.058
	(6.949)	(2.751)	(7.687)	(7.265)
N	1085	1009	1089	1045

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the Fixed Effects model, five lags of the dependent variable are also used as controls

with five lags of the reserves to GDP ratio as the independent variables, controlling for both push and pull factors, and Figure 2.11 plots the coefficients against the quantile for different lags of the reserves to GDP ratio.

The quantile regression results in reveal some interesting patterns. The coefficient on the third and fifth lags are consistently positive over all the quantiles. For the fifth lag this is consistent with the results of our dynamic panel data analysis as the coefficient on the the fifth lag was positive and significant across specifications. Furthermore, the coefficients on the fifth lag increase with the quantile: the coefficients increase between the 40th percentile and the 80th percentile. The coefficients on the second lag of reserves increase from being negative to being positive, as there is a sharp upward trend in the coefficients from the 30th percentile. To the contrary, the coefficients in the first and fourth lags decrease from the 30th and 40th percentile, respectively.

Figure 2.11: Quantile Regression Coefficients for Impact of Reserves on Capital Inflow, by lags

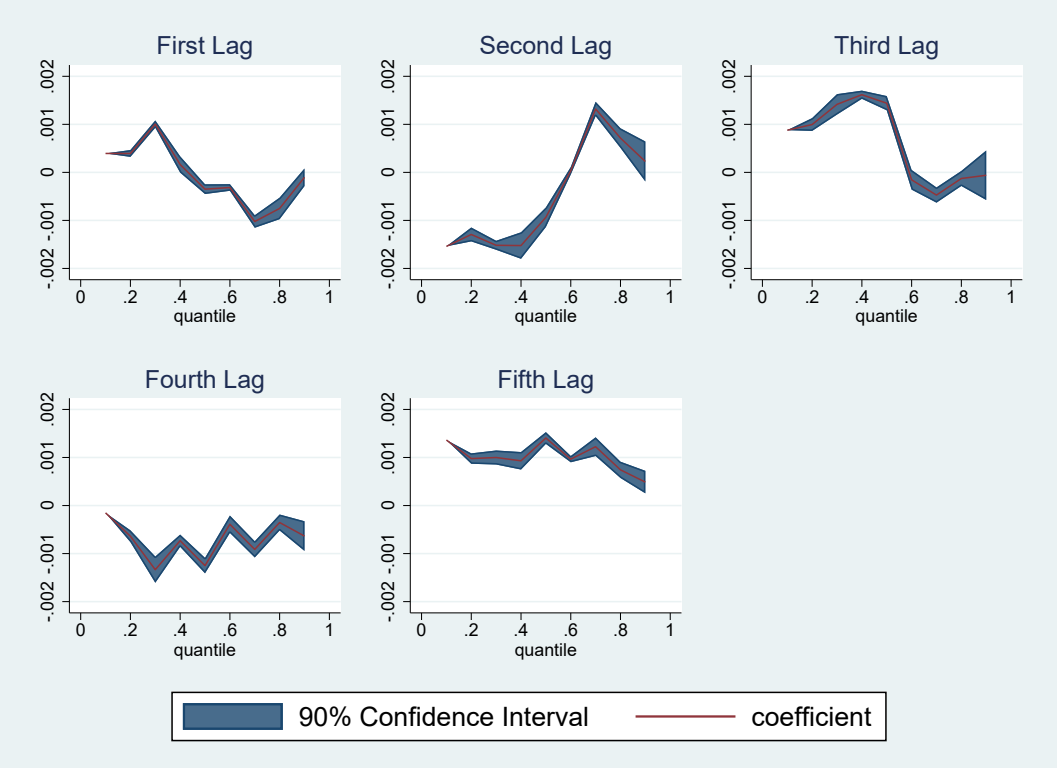


Table 2.6: Quantile Regression results for Gross Capital Inflows

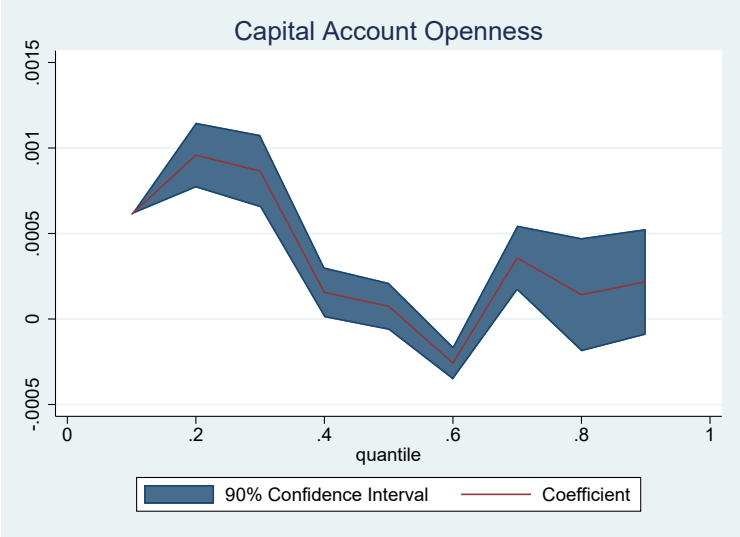
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Quantile	10th	20th	30th	40th	50th	60th	70th	80th	90th
l1.logreserves	0.00039***	0.00039***	0.00100***	0.00016	-0.00035***	-0.00031***	-0.00102***	-0.00075***	-0.00010
	(0.00000)	(0.00004)	(0.00005)	(0.00010)	(0.00006)	(0.00004)	(0.00008)	(0.00014)	(0.00011)
l2.logreserves	-0.00154***	-0.00129***	-0.00152***	-0.00152***	-0.00093***	0.00003	0.00132***	0.00071***	0.00023
	(0.00000)	(0.00009)	(0.00006)	(0.00017)	(0.00012)	(0.00005)	(0.00009)	(0.00012)	(0.00025)
l3.logreserves	0.00088***	0.00100***	0.00142***	0.00162***	0.00144***	-0.00015	-0.00047***	-0.00013	-0.00006
	(0.00000)	(0.00008)	(0.00013)	(0.00005)	(0.00009)	(0.00012)	(0.00010)	(0.00009)	(0.00031)
l4.logreserves	-0.00015***	-0.00064***	-0.00133***	-0.00073***	-0.00125***	-0.00039***	-0.00091***	-0.00035***	-0.00064***
	(0.00000)	(0.00007)	(0.00017)	(0.00008)	(0.00010)	(0.00011)	(0.00010)	(0.00010)	(0.00019)
l5.logreserves	0.00136***	0.00098***	0.00100***	0.00093***	0.00141***	0.00097***	0.00123***	0.00074***	0.00049***
	(0.00000)	(0.00007)	(0.00009)	(0.00011)	(0.00007)	(0.00004)	(0.00012)	(0.00010)	(0.00014)
Consistent	0.00045***	0.00045***	0.00029**	0.00090***	0.00073***	0.00095***	0.00015	0.00059***	0.00067***
	(0.00000)	(0.00008)	(0.00014)	(0.00016)	(0.00003)	(0.00008)	(0.00014)	(0.00007)	(0.00018)
Volatility	-0.00002***	-0.00001***	-0.00002***	-0.00001***	-0.00001***	-0.00001***	-0.00000***	0.00000	0.00002***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Current account	-0.02552***	-0.03033***	-0.03115***	-0.02193***	-0.01139***	-0.01269***	-0.01318***	-0.01066***	-0.01908***
	(0.00000)	(0.00178)	(0.00109)	(0.00169)	(0.00061)	(0.00035)	(0.00111)	(0.00086)	(0.00176)
Commodity Index	-0.00002***	-0.00001***	-0.00000***	-0.00001***	-0.00001***	-0.00001***	-0.00000	-0.00001***	-0.00001***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Per-capita Income	0.00005***	0.00016***	0.00034***	0.00027***	0.00018***	0.00039***	0.00036***	0.00060***	0.00064***
	(0.00000)	(0.00002)	(0.00005)	(0.00004)	(0.00002)	(0.00002)	(0.00002)	(0.00003)	(0.00008)
GDP growth	0.00702***	0.00945***	0.01020***	0.01003***	0.00708***	0.00865***	0.01051***	0.00812***	0.01539***
	(0.00000)	(0.00097)	(0.00018)	(0.00028)	(0.00028)	(0.00044)	(0.00033)	(0.00077)	(0.00133)
Chinn-Ito Index	0.00061***	0.00096***	0.00087***	0.00016*	0.00007	-0.00026***	0.00036***	0.00014	0.00022
	(0.00000)	(0.00012)	(0.00013)	(0.00009)	(0.00008)	(0.00006)	(0.00011)	(0.00020)	(0.00019)
Interest Rate	0.00009***	0.00010***	0.00005***	0.00000	-0.00004***	-0.00007***	-0.00003***	-0.00009***	-0.00011***
	(0.00000)	(0.00000)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00003)
Exchange rate	-0.00007***	-0.00017***	-0.00017***	-0.00013***	-0.00009***	-0.00019***	-0.00018***	-0.00037***	-0.00049***
	(0.00000)	(0.00002)	(0.00001)	(0.00002)	(0.00001)	(0.00001)	(0.00002)	(0.00002)	(0.00004)
ER Regime	-0.00030***	-0.00008**	0.00022***	0.00022***	0.00002	-0.00018***	-0.00029***	-0.00025***	-0.00034***
	(0.00000)	(0.00003)	(0.00002)	(0.00004)	(0.00002)	(0.00001)	(0.00004)	(0.00003)	(0.00005)
N	1085	1085	1085	1085	1085	1085	1085	1085	1085

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

If we consider the coefficients on the Chinn-Ito index over different quantiles, shown in Figure 2.12, they decrease with the higher quantiles of capital account openness. In addition, the coefficient go from being positive to being negative around the 50th percentile. The decline in coefficients, which suggest a decline in impact of gross inflows with increasing capital account openness for higher quantiles of the Chinn-Ito index is somewhat counterintuitive. However, the coefficients increase again around the 70th percentile, but are not significantly different from zero.

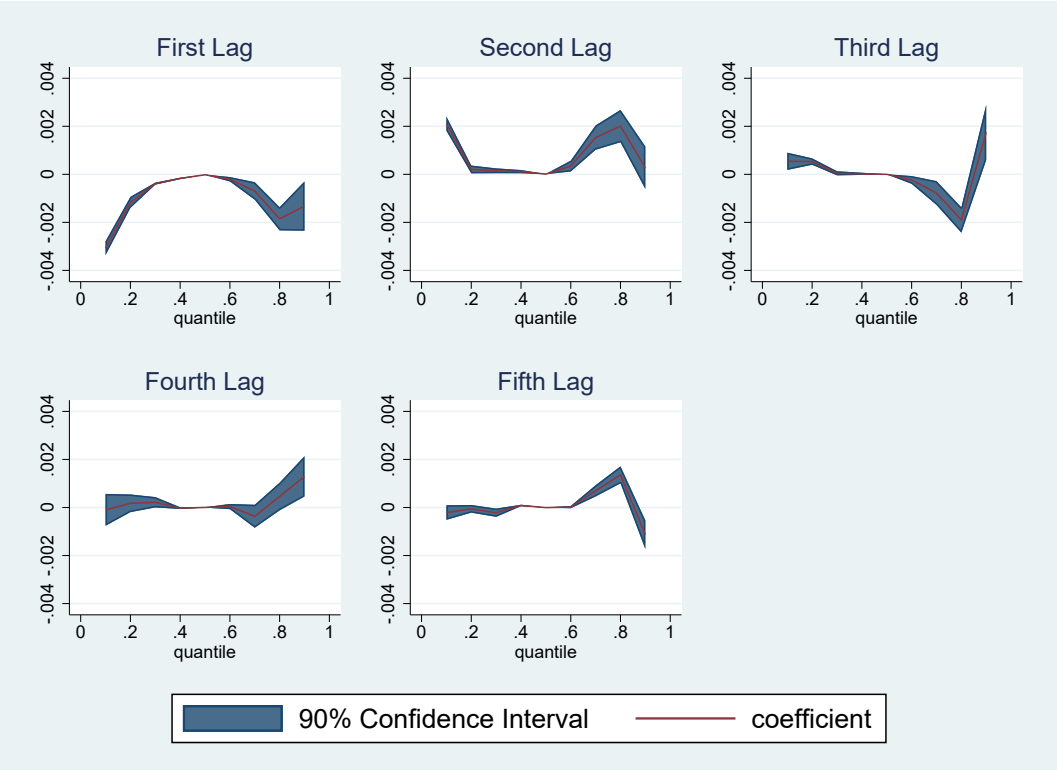
Figure 2.12: Quantile Regression Coefficients for Impact of Capital Account Openness on Gross Capital Inflow



The variation of the impacts of reserves to GDP on capital inflows is even more evident when we consider net capital inflows. Figure 2.13 show the results for relationship between the different quantiles of the lags of the reserves to GDP ratio on net capital inflows. In particular, it appears that there is a qualitative change in the relationship between reserves and capital inflows at the 70th or 80th percentile of reserves to GDP ratio. The full quantile regression results for the net capital account are shown in Table B.6 in Appendix C.

The results of the quantile regressions confirms the hypothesis that higher levels of reserve accumulation may be qualitatively different from lower levels of reserve accumulation insofar

Figure 2.13: Quantile Regression Coefficients for Impact of Reserves on Capital Inflow, by lags



as their impact on gross capital inflows are concerned. Therefore, it may be worthwhile to consider the the higher quantiles of reserve accumulations distinctly from the lower quantiles.

2.6.3 Highest Quantiles of Reserve Accumulation

Given the results of our quantile regression analysis, we identify the episodes of reserve accumulation in the top 30th percentile of the distribution. Following the algorithm used in Ghosh et al. (2014) to define surges in net capital inflows, we define a high accumulation episode as one which is in the top 30th percentile of the level of accumulated reserves at the level of a country over time, and in the top 30th percentile of all observations. We define these observations as those that meet our *global* criteria for high reserve accumulation. In addition we also identify the high accumulation episodes as those that are only in the top 30th percentile of the level of accumulated reserves at the level of a country over time. These observations are those that meet our *local* criteria for high reserve accumulation. Based on these definitions, we identify 246 global episodes of high accumulation 498 local episodes of higher reserve accumulation. Tables 2.7 and 2.8 summarize the characteristics of levels of reserves, gross inflows, net inflows, external debt, and short term external debt as a share of GDP for global and local instances of high reserve accumulation.

The increasing number of episodes of high reserve accumulation over time is consistent with the pattern of increased foreign exchange intervention since the 1990s. Comparing the descriptive statistics of the global episodes of high reserve accumulation with the descriptive statistics presented in 2.1, it is interesting to note that except for the decade 2000–09, the average gross capital inflows are higher in the identified episodes of global high reserve accumulation. Similarly, average short-term external debt is higher in the last two decades (2000–09 and 2010–18) in our global episodes of high reserve accumulation as compared to our entire sample. On the contrary, except for the decade 2010–18, net capital inflows are on average lower in the global episodes of high reserve accumulation in every other decade. Furthermore, average external debt is lower in every decade in our global episodes of high

Table 2.7: Mean and Standard Deviation of key variables in Global Instances of High Reserve Accumulation

		1970-1979	1980-1989	1990-1999	2000-2009	2010-2018
Reserves	Mean		0.162	0.298	0.240	0.252
	SD		0	0.216	0.126	0.136
	Median		0.162	0.227	0.199	0.233
Gross Inflows	Mean		0.083	0.111	0.095	0.068
	SD		0	0.140	0.2	0.163
	Median		0.083	0.082	0.072	0.063
Net Inflows	Mean		0.0000	-0.0005	-0.001	0.001
	SD		0	0.002	0.004	0.008
	Median		0.000	-0.0009	-0.001	-0.0001
External Debt	Mean			0.105	0.278	0.283
	SD			0	0.117	0.126
	Median			0.105	0.252	0.230
Short-term Debt	Mean			0.0001	0.049	0.060
	SD			0	0.032	0.038
	Median			0.0001	0.041	0.043
	N	0	1	10	116	119

reserve accumulation, except 2000–09. However, the average net capital inflows, external debt, and short-term external debt are higher in every decade in the episodes of high reserve accumulation.

Table 2.8: Mean and Standard Deviation of key variables in Local Instances of High Reserve Accumulation

		1970-1979	1980-1989	1990-1999	2000-2009	2010-2018
Reserves	Mean	0.053	0.034	0.025	0.141	0.214
	SD	0.015	0.024	0.046	0.141	0.142
	Median	0.051	0.036	0.006	0.163	0.192
Gross Inflows	Mean	0.071	0.064	0.081	0.107	0.050
	SD	0.058	0.067	0.060	0.848	0.360
	Median	0.046	0.062	0.082	0.074	0.057
Net Inflows	Mean	0.00003	-0.00002	0.0004	-0.0004	0.001
	SD	0.001	0.001	0.002	0.003	0.008
	Median	-0.00002	0.0000	-0.00003	-0.00001	-0.00004
External Debt	Mean			0.714	0.262	0.287
	SD			0.398	0.107	0.110
	Median			0.528	0.242	0.247
Short-term Debt	Mean			0.042	0.044	0.058
	SD			0.013	0.030	0.033
	Median			0.037	0.036	0.044
	N	25	52	85	175	161

Considering the episodes of locally high reserve accumulation, average gross inflows and average net inflows are lower than averages in table 2.1 in every decade. This is also the case for average external debt, except for the decade 1990–99, and for average short-term external debt. In comparison, the average net capital inflows are higher in all decades during the episodes of locally high reserve accumulation.

In addition to defining episodes of globally and locally high reserve accumulation due to foreign exchange intervention, we identify episodes of surges in gross capital inflows and net capital inflows, using both local and global criterion is described above. We identify 430 global and 505 local surges in gross capital inflows and 203 global and 427 local surges in net capital inflows.

2.6.4 Occurrence of Capital Inflow Surges and Crises

We examine whether the occurrence of surges in capital inflows is related to higher reserve accumulation in the preceding years. Specifically, we estimate a panel logistic regression model with our surge variable, for both gross inflows and net inflows, as the dependent variables. The results for gross inflows are shown in Table 2.9, while those for net flows are shown in Table 2.10. We estimate the model used lagged values of the reserves and the control variables we used in our fixed effects model, the results for which are shown in Column (1). Next, we estimate the model with the standard score of the country's reserve accumulation in five years prior to the current year as the independent variable, with the same controls, and the results are shown in Column (2). Column (3) shows the estimates of the model when high reserve episodes are used as the independent variable. In other words, Column (3) shows the result for the examination of whether the episodes of high reserve accumulation are likely to be associated with a surge in gross capital inflows within one, two, three, four, or five years. Column (4), on the other hand estimates the model with the level of reserve accumulation in the episodes of high reserve accumulation. We do this by interacting our episode of high reserve accumulation variable with our reserves variable.

Table 2.9: Logistic Regression Results for Surges in Gross Capital Inflows

	(1)	(2)	(3)	(4)
	Reserves	$Z_{Reserves}$	High Reserve Episodes	Reserves in High Reserve Episodes
l1	0.281	0.762	0.685**	-0.103
	(0.259)	(0.711)	(0.281)	(0.401)
l2	-0.095	-0.153	-0.548*	0.649
	(0.334)	(0.934)	(0.318)	(0.475)
l3	0.013	0.110	-0.168	0.244
	(0.329)	(0.931)	(0.330)	(0.466)
l4	-0.128	-1.076	0.214	-0.260
	(0.331)	(0.977)	(0.341)	(0.468)
l5	0.428	1.478**	-0.611**	1.269***
	(0.266)	(0.744)	(0.305)	(0.409)
Volatility	-0.003	-0.003	-0.004*	-0.004*
	(0.002)	(0.002)	(0.002)	(0.002)
Per-capita Income	2.028**	2.032**	2.680***	2.663***
	(0.893)	(0.888)	(0.909)	(0.933)
GDP growth	3.216*	3.693**	3.363*	2.433
	(1.734)	(1.733)	(1.737)	(1.786)
Interest Rate	-0.116***	-0.125***	-0.110***	-0.102**
	(0.042)	(0.043)	(0.042)	(0.043)
Chinn-Ito Index	0.184	0.024	-0.022	0.412
	(0.632)	(0.629)	(0.614)	(0.646)
N	1018	1018	1018	1018

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The coefficients and standard errors for the control variables *commodity index*, *current account*, *exchange rate* and *ER Regime* are not shown in the interest of space, and are available on request.

Our results indicate that in the case of gross capital inflows, there is no significant relationship between the occurrence of a surge in gross capital inflows and the lagged values of the reserves to GDP ratio (Column 1). However, when we consider the standard score of the reserves accumulation of a country in a given year, the coefficient on the fifth lag is positive and significant. Specifically, the coefficient on the fifth lag is positive and significant, which means that a unit increase in the standard score of reserves as a percentage of GDP is associated with an increase in the odds of occurrence of a surge in capital inflow by 4.38 within five years. However, when we consider episodes of high reserve accumulation, the coefficients on the first, second, and fifth lags are significant. Specifically, a unit increase in the standard score is associated with an increase in the odds of the occurrence of a surge in gross capital inflows by 1.98 within a year. However, the coefficients on the second and fifth lag are negative and significant. The level of reserves in a high reserve episodes is also associated with a statistically significantly higher probability of a surge in gross capital inflows within five years. By contrast, the results in table 2.10 show that a high reserve episodes or reserve accumulation is not associated with a statistically significant higher probability of a surge in net capital inflows.

We also try to assess whether the occurrence of crises are associated with episodes of high reserve accumulation in the preceding years. Table 2.11 shows the logistic regression results for the occurrence of currency crises. Column (1) shows the results for the model estimated with the lagged values of the reserves variable as the independent variables. Column (2) shows the results for the model estimated with the standard score of reserves as a share of GDP in the preceding five years as independent variables. Column (3) shows the result for the logistic regression model with the occurrence of an episode of high reserve accumulation in the preceding five years as independent variables. Finally, Column (4) shows the results for the logistic regression model with the interaction between episodes of high reserve accumulation and level of reserves in the preceding five years. The probability of occurrence of currency crisis decreases with an increase in reserve accumulation in the year prior to a crisis as the

Table 2.10: Logistic Regression Results for Surges in Net Capital Inflows

	(1)	(2)	(3)	(4)
	Reserves	$Z_{Reserves}$	High Reserve episodes	Reserves in High Reserve episodes
l1	-0.121	0.113	-0.200	0.013
	(0.328)	(1.170)	(0.411)	(0.516)
l2	-0.111	-0.156	0.159	-0.277
	(0.434)	(1.447)	0.159	(0.619)
l3	0.316	1.538	0.115	0.286
	(0.439)	(1.472)	(0.468)	(0.643)
l4	-0.032	-2.574*	-0.182	0.095
	(0.422)	(1.562)	(0.458)	(0.613)
l5	0.078	1.146	0.466	-0.219
	(0.333)	(1.240)	(0.458)	(0.520)
Volatility	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Per-capita income	-2.359*	-2.049	-2.346*	-2.490*
	(1.346)	(1.319)	(1.377)	(1.400)
GDP growth	0.003	0.246	0.341	0.165
	(2.370)	(2.365)	(2.353)	(2.383)
Interest rate	-0.083	-0.082	-0.085	-0.086
	(0.060)	(0.060)	(0.061)	(0.061)
Chinn-Ito Index	0.934	1.074	0.933	0.884
	(1.061)	(1.077)	(1.063)	(1.066)
N	457	457	457	457

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The coefficients and standard errors for the control variables *commodity index*, *exchange rate* and *ER Regime* are not shown in the interest of space, and are available on request.

coefficients on the first lag are negative and significant. However, higher reserve accumulation two years prior is associated with a statistically significant higher odds of the occurrence of a currency crisis when considering the level of reserves as a share of GDP. This is evident from the coefficients presented in Column (1). Higher reserve accumulation and a high reserve accumulation episode five years prior is also associated with a higher probability of occurrence of a currency crisis (Columns (1), (2), and (3)).

Table 2.11: Logistic regression results for Currency Crises

	Reserves	$Z_{Reserves}$	High Reserve episodes	Reserves in High Reserve episodes
l1	-3.423*	-35.215*	-21.733	3.278
	(2.064)	(18.382)	(3355.419)	(4.268)
l2	4.496*	4.841	-17.347	7.721
	(2.439)	(14.547)	(2875.298)	(8.369)
l3	-2.560	-0.820	-4.581	-0.817
	(2.698)	(13.684)	(3.681)	(2.145)
l4	-2.519	-13.328	2.504	-0.684
	(2.456)	(15.447)	(2.720)	(1.573)
l5	8.106*	41.618*	7.844**	-2.324
	(4.496)	(21.778)	(3.424)	(1.890)
volatility	0.015	-0.018	0.012	-0.009
	(0.018)	(0.027)	(0.020)	(0.017)
Per-capita Income	-17.044**	-17.174**	1.385	3.091
	(8.023)	(8.546)	(8.988)	(3.459)
GDP Growth	-3.193	-25.297	-14.679	-8.828
	(8.107)	(16.920)	(10.470)	(6.584)
Current Account	-56.873	-94.880	-84.087	-40.154
	(54.463)	(72.273)	(55.331)	(25.819)
Interest Rate	0.363	0.323	0.732*	0.469***
	(0.227)	(0.330)	(0.376)	(0.174)
Chinn-Ito Index	-18.138**	-9.974	-6.038	-3.960
	(8.158)	(10.476)	(5.544)	(3.230)
N	255	255	255	424

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The coefficients and standard errors for the control variables *commodity index* and *ER Regime* are not shown in the interest of space, and are available on request.

A similar result is not observed for systemic banking crises. In other words, we do not find evidence of higher reserve accumulation and high reserve accumulation episodes being associated with a higher probability of occurrence of a systemic banking crisis. On the contrary, we find that higher reserve accumulation and a episode of high reserve accumulation

is associated with a statistically significantly lower probability of occurrence of a systemic banking crises within 1 year as is evident in Columns (1)–(3) of Table 2.12.

Table 2.12: Logistic Regression results for Systemic Banking Crises

	(1) Reserves	(2) $Z_{Reserves}$	(3) High Reserve episodes	(4) Reserves in High Reserve episodes
l1	-9.500*	-20.185*	-5.403**	5.267**
	(5.158)	(11.801)	(2.709)	(2.581)
l2	2.256	19.857	1.118	-3.187
	(3.863)	(13.048)	(3.022)	(2.453)
l3	-5.801	-38.004**	-4.289	-1.880
	(4.434)	(18.712)	(3.685)	(2.103)
l4	-2.271	22.861	0.029	1.506
	(4.278)	(16.473)	(2.806)	(2.452)
l5	4.753	1.154	3.761	-5.121**
	(4.549)	(15.073)	(3.760)	(2.504)
volatility	0.047**	0.038**	0.031**	0.021**
	(0.022)	(0.018)	(0.015)	(0.010)
Per-capita Income	41.108*	25.221*	11.276	4.484
	(23.119)	(14.106)	(10.186)	(3.609)
GDP growth	26.939	30.410	10.863	0.982
	(21.858)	(20.520)	(17.074)	(9.163)
Current account	-196.415	-144.787	-92.735	-71.538**
	(135.392)	(94.241)	(76.348)	(31.276)
Interest rate	-0.476	-0.242	-0.106	0.236
	(0.435)	(0.529)	(0.355)	(0.226)
Chinn-Ito index	0.325	-8.553	-9.124	-4.349
	(12.739)	(11.175)	(7.846)	(3.643)
N	506	506	506	720

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The coefficients and standard errors for the control variables *commodity index* and *ER Regime* are not shown in the interest of space, and are available on request.

The change in signs in the significant coefficients between the first, second, and fifth lag of reserves in Table 2.11 suggest that there may be some non-linearities in the relationship between reserve accumulation and the occurrence of currency crises. On the other hand, it appears that foreign exchange reserves provide a stabilizing influence as far as systemic banking crises are concerned. It is not immediately clear why we see these contrasting effects of foreign exchange intervention on currency crises and systemic banking crises; further

exploration is required in order to understand these differential impacts, which are beyond the scope of this dissertation.

2.7 Implications and Conclusions

The results in this chapter pose a challenge to the assumptions about the impacts of accumulation of foreign exchange reserves on financial stability. Even though the literature suggests that the accumulation of reserves allows central banks to protect against the impacts of potential capital flight. However, our results show that the impact of foreign exchange intervention is not so straightforward. In particular, we show that very high levels of reserve accumulation are qualitatively different from lower levels of reserve accumulation, and have impacts that are distinct from scaled up levels of lower reserve accumulations. In particular, the direction of the relationship between reserve accumulation in the preceding first, second, and fifth year changes at 60th and 80th percentiles of reserve accumulation. This warrants a closer look at the highest levels of reserve accumulation resulting from foreign exchange intervention.

When we analyze the episodes of reserve accumulation in the top 30th percentile in reserve accumulation, we find that higher reserve accumulation and episodes of high reserve accumulation are associated with a higher probability of occurrence of a surge in gross capital inflows within one year and five years. However, a similar relationship is not observed between foreign exchange reserve accumulation and net capital inflows. We also observe that while higher reserve accumulation is associated with a lower probability of crisis within one year, our results also show that higher reserve accumulation and episodes of high reserve accumulation are also associated with a heightened probability of a currency crisis within five years. On the other hand, higher foreign exchange reserve accumulation is associated with a lower probability of the occurrence of a systemic banking crisis.

Therefore, this chapter finds some evidence of two opposing and contradictory impacts on foreign exchange intervention on gross capital inflows, net capital inflows, and occurrence of

currency crises. Further analysis is needed to identify the conditions under which the stabilizing effect dominates the destabilizing effects of foreign exchange intervention. Specifically, the role of mitigating factors and effectiveness of other policy factors like capital controls would be of interest. This is not to suggest that the policy of accumulating foreign exchange reserves is irrational, and that they should not conduct foreign exchange intervention to accumulate foreign exchange reserves. In the context of an average lower level of capital controls, it is perfectly rational for Central Bankers to continue to intervene in the foreign exchange market and accumulate foreign exchange reserves. Reserves clearly play an important role in fostering global financial stability in the absence of other more effective measures of protecting against the destabilizing effects of volatile capital flows. However, this chapter shows that they can also have a destabilizing effect, and their use and effectiveness need to be evaluated taking this potential destabilizing effect into account.

CHAPTER 3

EXORBITANT PRIVILEGE OR ULTIMATE RESPONSIBILITY?: ACCESS TO THE INTERNATIONAL LENDER OF LAST RESORT

3.1 Introduction

The global financial safety net is especially crucial insofar as, like an international lender of last resort, it can provide emergency liquidity to countries that require it. Scheubel and Stracca (2016) characterize the global financial safety net as consisting of (i) own foreign exchange reserves, (ii) the International Monetary Fund, (iii) Regional Financial Arrangements, and (iv) central bank swap lines. Dutt (2018) and Chapter 1 argues that countries that have access to central bank swap lines, and swap lines from the Federal Reserve in particular, rely less on other aspects of the global financial safety net. For instance, countries that have had access to Federal Reserve Swap lines hold fewer foreign exchange reserves. The differential use of the different parts of the global financial safety net is, in part, a reflection of differential access, especially to swap lines and emergency loans.

Emergency liquidity support from the International Lender of Last Resort has been found to be extremely effective in alleviating the pressure of or staving off an imminent crisis. It has often been the case that simply an agreement with the ILLR institutions has made it unprofitable for speculators to continue to speculate against a country or an economy and has therefore stemmed the outflow of capital from an economy in distress. Munk (2010) highlights how often ESF loans were used as "window dressing"[1] until such a time that an

[1]This meant that the borrowing government were required to leave the funds in an account at the Federal Reserve Bank of New York until negotiation with the International Financial Institution concerned could be completed.

IMF agreement could be negotiated: therefore, they calmed financial markets even if the funds made available through the ESF loans were never used for stabilization. Similarly, the mere announcement of a swap line raised the potential cost for speculators to continue betting against a deficit country's currency (Bordo et al., 2014). Aizenman et al. (2010b) argue that in 2009, the Bank of Korea spent $60 billion in defending the value of the won, but was unable to reduce the pressure on the won. It was only when the Federal Reserve established a swap agreement with the Bank of Korea of a maximum of $30 billion drawing that some measure of stability was restored to the won markets. Further Aizenman and Pasricha (2010) find that extension of swap lines had a large impact on the currencies of emerging markets that had access to swap arrangements with the Federal Reserve relative to those that did not, even though the impact on the credit default swap spreads was much smaller. Bahaj and Reis (2019) additionally find that extension of swap agreements between central banks allowed commercial banks in recipient country to access funding at lower costs and in turn provide liquidity to firms, and reduce credit risk of the their respective banking systems (Morelli et al., 2015; Allen and Moessner, 2010).

McDowell (2017) documents the extensive nature of the financial rescue operations of the Federal Reserve and the Exchange Stabilization Fund of the US Treasury, and the importance role the United States economy has played in stabilizing the global financial system. Drawing on McDowell (2017) and Sahasrabuddhe (2019), we show that very few countries have historically had access to swap lines from the Federal Reserve or have received assistance from the Exchange Stabilization Fund of the U.S. Treasury. Therefore, we pose the question: what determines access to emergency financial assistance from the United States, either in the form of a central bank swap line or emergency loan arrangement from the Exchange Stabilization Fund of the U.S. Treasury? Do these institutions provide emergency liquidity to the countries that have strong linkages with the U.S. economy, countries that exhibit "good" policy behavior, countries that can help the U.S. further its foreign policy objectives, or some combination thereof?

By examining FOMC meeting minutes between 1962 and 2020, this chapter documents the number, size, and recipients of Reciprocal Currency Arrangements or swap lines from the Federal Reserve, and the extension of short term loans from the Exchange Stabilization Fund of the US Treasury. Thereafter, this chapter empirically examines the economic and political factors that determine access to these institutions between 1982 ans 2018. We find that US bank exposure to an economy and an economy's share in US exports play an important role in determining access to the Federal Reserve swap lines and short term loans from the US Treasury. We also find that, significantly, political factors such as capital account openness, trade agreements and defense cooperation agreements with the United States, unemployment in the United States, and party composition of the United States government also play an important role in determining access to these institutions.

The rest of the chapter is structured as follows. Section 3.2 provides the historical context and background of the functions of an International Lender of Last Resort, and the institutions that have the capacity to act as the International Lender of Last Resort, namely the Federal Reserve and the US Treasury. Furthermore, this section also documents the changing objectives of these institutions over time, the relationship between these two institutions, and the limited literature that addresses the selective extension of ILLR support. Section 3.3 describes the data used and the methodology followed in this chapter. Section 3.4 presents the descriptive statistics of our data. Section 3.5 presents the results of our empirical model and Section 3.5.4 describe the robustness checks performed to ensure that the results are robust to alternative specification. These results and robustness checks are conveniently summarized in Section 3.5.5. Section 3.6 examines the cases of countries that received ILLR support in some instances and not in others, and intertemporally compares the differences in our explanatory variables. Finally, Section 3.7 concludes the chapter. Thereafter, Appendix C.1 lists all the loans provided by the Exchange Stabilization Fund and all swap agreements of the Federal Reserve since 1962, and Appendix C.2 presents the robustness checks in full detail.

3.2 Historical Context and Background

In this section, I present the historical context and background of the extension of swap agreements by the Federal Reserve and short-term loans from the Exchange Stabilization Fund. This is based on our analysis of the minutes of the meetings of the Federal Open Market Committee between 1962 and 2020, in addition to the existing related literature. Specifically, we looked at the monthly meeting minutes, looking for discussion of establishments of new swap agreements or renewal of existing swap agreements, and the reasons cited by the committee members for establishing or renewing swap agreements.

3.2.1 The International Lender of Last Resort

A Lender of Last Resort has become an indispensable stabilizing features of modern money, credit, and financial markets. National Central Banks are typically the lenders of last resort in their respective national economies as, in the event of destabilizing influences in national financial systems, they can and do lend freely, at a high rate of interest, based on good collateral, especially when credit markets seize up and are unwilling to provide liquidity to borrowers that need it (Bagehot, 1873). Central Banks are able to do so as, in the last resort, they can create liquidity in the national currency in which there is a shortage of liquidity in the national credit markets. Under normal circumstances, the availability of emergency liquidity alleviates any credit shortage that is making financial market participants nervous.

However, if there is a shortage of liquidity in another currency in the national credit markets that is threatening financial stability, the central bank's ability to act as an effective lender of last resort depends on its capacity to provide liquidity in the currency that is in short supply in the national credit markets. The questions of capacity arise crucially because a national central bank cannot necessarily create liquidity in the currency that it does not issue. This constraint on Central Banks has become increasingly relevant because of financial globalization which has resulted in increased borrowing and lending outside the borders of the national currency. Specifically, globalization has meant that more and more economic

activity is being conducted all over the world in a few key currencies. The US Dollar, in particular, is the dominant anchor currency or the global reserve currency (Ilzetzki et al., 2017). Therefore, US Dollar shortages have the potential to create pressures on the financial system that individual central banks cannot alleviate, apart from the U.S. Federal Reserve of course.

The Federal Reserve has paid attention to dollar shortages globally, since at least 1962, when the Federal Reserve established Reciprocal Currency Arrangements or a network of swap lines with 9 central banks in Austria, Belgium, Canada, England, France, Germany, Italy, the Netherlands, and Switzerland (Bordo et al., 2014). The swap arrangements between central banks typically take the following form: Central Bank A creates a deposit for Central Bank B on its balance sheet of the currency it issues loan. Central Bank B does the same for Central Bank A on its balance sheet. The size of the two deposits are determined by the spot exchange rate between the two currencies. At an agreed upon future date, this deposit is eliminated on the respective balance sheets. Effectively, one central bank loans the currency it issues to another central bank and holds the currency of that central bank as collateral (Bahaj and Reis, 2019; Allen and Moessner, 2010). The Central Bank that is issuing the loan charges an interest rate that is agreed upon which is typically a spread on the overnight swap interest rate between the two currencies, which is the USD overnight index swap (OIS) rate (Bahaj and Reis, 2019). Since their inception, swap lines from the Federal Reserve were not standing facilities and are typically instituted occasionally for a fixed period of time and a limited amount of US Dollars. However, since 1994, the Federal Reserve has standing swap facilities with the Banco de México and Bank of Canada, as a part of the North American Framework Agreement, and with the Bank of Canada, the Bank of England, the European Central Bank, the Bank of Japan, and the Swiss National Bank since 2013.

Apart from the Federal Reserve, the US Treasury has also made US dollar loans to foreign governments that are "fundamentally solvent" (Henning, 1999, pp. 9) through its

Exchange Stabilization Fund for "preventing excessive downward overshooting of their currencies, smoothing their balance of payments adjustment, and reducing output and employment losses" (Henning, 1999, pp. 9). The Exchange Stabilization Fund was created by the Congress and President Franklin D. Roosevelt through the Gold Reserve Act of 1934, and has made stabilization loans and foreign exchange interventions under the discretion of the Secretary of the Treasury, subject only to the approval of the President. The stabilization loans that the ESF provides are required to be short-term (less than 1 year), although the ESF has provided medium-term loans in the past, at an interest rate that is higher than the average interest rate on short-term government bills.

Therefore, a threat to financial stability in any financial system from a shortage of the reserve currency can only be resolved through a USD loan, either from the Federal Reserve or the US Treasury's Exchange Stabilization Fund (ESF). Given that the a US Dollar shortage is the only currency that can create widespread financial instability, the US Federal Reserve and the US Treasury collectively are the International Lender of Last Resort (ILLR). To some extent, US Dollar reserves held by national central banks stabilize the exchange rate and the financial system to some extent, but this would be limited by the size of these reserves accumulated during normal times.

It is important to note here that the IMF does not and cannot play the role of the International Lender of Last Resort. The IMF does not have the necessary flexibility (as it cannot create high powered money (Schwartz, 1998)) or agility to act in a rapid time-sensitive manner without conditionalities in order to provide emergency liquidity to economies that need it. This is despite the creation of two precautionary credit lines in the wake of the 2008 global financial crisis, the Flexible Credit Line (FCL) and Precautionary and Liquidity Line (PLL).[2] Therefore, unlike the ESF and the Federal Reserve, the IMF cannot lend freely, at

[2]Introduced in 2009 and 2011, respectively, the FCL and PLL were instituted as precautionary facilities through which funds could be disbursed rapidly to countries that were facing imminent balance of payments crisis. These facilities were available to countries with a "track record of prudent economic and financial management" (Birdsall et al., 2017, pp. 2). While FCL does not come with any conditionalities and the

at a premium, and against good collateral (Bagehot's rule) since most countries do not at present qualify or want to qualify for the IMF emergency credit facilities.

3.2.2 Changing Objectives of the ILLR

Even though we have defined the Federal Reserve and the ESF as the International Lender of Last Resort, the objectives of these institutions have evolved over time. Initially, both these institutions were geared towards stabilizing the value of the dollar through foreign exchange intervention at the time of the Gold Standard and the Bretton Woods era, when fixed exchange rates were the norm.

In fact, in the early years of the operation of the Federal Reserve's Reciprocal Currency Arrangements, the Federal Reserve used the swap lines with other several banks to borrow key foreign currencies in order to maintain the gold value of dollar at $35 dollars an ounce of gold. From the 1962 to the closing of the gold window in 1971, the Federal Reserve drew on swap lines to borrow $11.5 billion to "provide cover to foreign central banks for unwanted dollar exposures" (Bordo et al., 2014). This allowed the Federal Reserve to protect its gold reserves, and therefore alleviate the pressure of the Triffin paradox[3]. Similarly, foreign central

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PLL has minimal conditionalities attached with it, countries need to pre-qualify to be eligible to avail of these facilities from the IMF. As of the time of writing, only Chile, Colombia, Peru, and Mexico are eligible to draw on the FCL and North Macedonia and Morocco are eligible to draw on the PLL. Poland also had a FCL facility until 2017, although it was not drawn upon. The low uptake of this facility is likely to be due to the stigma of approaching the IMF for assistance (Birdsall et al., 2017). In March and April 2020, the IMF created new lending arrangements that do not come with conditionalities, that are the Rapid Financing Instrument and the Rapid Credit Facility. However, they appear to come with policy "advice", and it is too soon to tell if these facilities can make the IMF a more effective ILLR.

[3]The Triffin paradox or dilemma refers to the basic conflict that arises for the economy of the country the currency of which is the global reserve currency (Triffin, 1960). Essentially, in order to supply the global economy with the US Dollar, the US economy needs to run trade deficits. However, the growing trade deficit of the US in a fixed exchange rate system would create depreciation pressures on the US Dollar, since the total claims on the gold reserves through the US dollar would exceed the total value of the Federal Reserve's gold reserves. In order to maintain its value, the Federal Reserve would have to sell gold, of which it had a finite supply. However, the existence of the swap network meant that the Federal Reserve could borrow Deutsche Mark or Swiss Francs and use them to defend the value of the US Dollar against these currencies. Eichengreen (2013) also draws attention to the Triffin Dilemma when considering the importance of international considerations in the Federal Reserve's monetary policy, when they identify that it was in the 1960s that US foreign monetary liabilities were going to be higher than the US gold reserves, which is when the Federal Reserve first established Reciprocal Currency Arrangements.

banks drawing on the swap lines to borrow US Dollars also facilitated the defense of the gold value of the dollar, as foreign central banks could supplement their dollar reserves without adding to the U.S. current account deficit. However, after the collapse of the Bretton Woods system, the use of the swap lines to support the value of the dollar declined, and the Federal Reserve stopped drawing on swap lines for its foreign exchange interventions by 1980 (Bordo et al., 2014).

Similarly, the ESF was also initially geared towards defending the value of the US Dollar. In fact, it was created as a counterpart to the UK government's Exchange Equalisation Account, which was set up to manage the value of the pound sterling in global markets. The ESF served as the US Treasury's main instrument in the Tripartite Monetary Accord of 1936 with Britain and France. However, between the establishment of the ESF in 1934 and 1962, there was little need for intervention, and thereafter, ESF conducted foreign exchange intervention along with the Federal Reserve (Schwartz, 1997). A large number of loans that were extended from the ESF to foreign governments were also ultimately meant to support the value of the dollar and/or the fixed exchange rate system; for instance, dollar loans were made to the United Kingdom to facilitate a support of the value of the pound sterling in 1967 and 1968 (Henning, 1999). After the suspension of the fixed exchange rate system in 1973, the ESF and the Federal Reserve were not obligated to maintain the dollar at a fixed value relative to other currencies or gold. However, until the Reagan Administration, both the ESF and Federal Reserve intervened to support the value of the dollar on several instances. For example, in 1979 and 1980, the ESF intervened frequently to purchase foreign exchange, as the objective of the Carter administration was to eliminate dependence on foreign monetary authorities for maintaining the value of the dollar.

That being said, the objectives of the use of ILLR seem to be more ambiguous after the collapse of the Bretton Woods system, since one of the stated objectives of both the ESF and Reciprocal Currency Arrangements was the defense of the value of the US Dollar. Arguably, these institutions are still intervening to defend the value of the dollar as the global

reserve currency, by alleviating dollar shortages outside the national borders of the United States. However, it is clear that neither the Federal Reserve or the U.S. Treasury conducts operations with the explicit objective of acting as the International Lender of Last Resort, even though on many occasions outlined in this chapter, the impact of their international activities has been one of providing stability to the global financial system. Specifically, it is not that these institutions want to act as the Lender of Last Resort for the global economy with a view to foster global financial stability, at least not explicitly and consistently in the post-War era. Insofar as the confidence in the US Dollar is related to the stability of the global financial system, these institutions do act as the ILLR, but only incidentally.

This has been a consistent contradiction of the global monetary system for many decades that the issuer of the key global currencies are either unwilling or unable to stabilize the global monetary system. This could either be due to domestic political and economic concerns or due to strategies of foreign policy or simply because stabilizing the global financial system is not part of its mandate. And this situation is not without historical parallels; for instance, Kindleberger (1973) argues that duration and the devastation of the Great Depression was a result of the instability in the global economy. This is turn was a result of "British inability and the United States unwillingness to assume responsibility for stabilizing" the global economy (Kindleberger, 1973, pp. 292). The British inability is relevant in that at this time the pound sterling can be thought of as the key currency, albeit a waning one. However, what is more relevant is the "United States unwillingness" as this was also the period that was characterized by the "changing center of gravity of the international system," with its weight shifting away from the United Kingdom to the United States (Eichengreen, 2008, pp. 89), and the US Dollar becoming the key currency in the global monetary system.

Therefore, in general, the institutions that have the ability to act as the International Lender of Last Resort, namely, the Federal Reserve and the Department of Treasury, are not willing to act as the International Lender of Last Resort. However, on several occasions, these institutions have fulfilled the role of the ILLR, only to certain countries. This chapter

explores what are the factors that determine which countries the ILLR institutions are willing to lend to during the instances in which they do so.

3.2.3 Relationship between the Exchange Stabilization Fund and the Federal Reserve

While the US Treasury's ESF and the Federal Reserve System's Reciprocal Currency Arrangements are institutionally distinct facilities, this section discusses how they compare as regards the size of the loans available from each facility, the recipients of these loans, the institutions involved in the loans, and the duration and frequency of the loans that are typically extended.

Size: The Federal Reserve, like most modern central banks, is considered to be independent of the government of the United States. However, as regards the defense of the value and strength of the dollar, both the ESF and the Federal Reserve have played a key and inter-related role, often in coordination with the other institution. For instance, the foreign currency being held in the ESF could be temporarily converted into US dollars in order to conduct its operations and supplement the size of funds at its disposal.[4] In general, the role of managing the dollar is explicitly under the responsibility of the Treasury and the Federal Reserve, in principle, is just the agent for the Treasury. However, as far as the ESF is concerned, its size was much smaller than the size of the funds at the disposal of the Federal Reserve, especially given that the Federal Reserve can create liquidity, while the ESF could only use the funds on its balance sheet. Therefore, the loans or bilateral swap arrangements were of a much larger magnitude than the outstanding loans that the ESF could provide. Nonetheless, the ESF had a much clearer mandate of conducting foreign exchange intervention to maintain the value of the dollar against gold and against other key currencies, as

[4]This is called the practice of *warehousing* It involves the spot sale of foreign currency to the Fed for dollars along with a parallel repurchase at some specified date in the future. The size of the warehousing facility has varied over time, being raised from $1.5 billion in January 1977 to $15 billion in March 1990. The limit was then eventually reduced to $5 billion in 1992, only to be increased again to $20 billion in 1995 during the Mexican peso crisis.

opposed to that of the Federal Reserve System. As a result, the Federal Reserve System carried the burden of stabilizing the global dollar system to a much larger extent than the ESF, especially during the gold exchange standard (Henning, 1999).

Recipients: Nonetheless, the ESF provided several stabilization loans to foreign governments throughout its existence. The list of recipients of loans from the ESF are much wider than the recipients of swap lines from the Federal Reserve. Specifically, the ESF extended stabilization loans to several governments in Latin America and Eastern Europe and on multiple occasions. By contrast, during the early years of operation of the Federal Reserve Reciprocal Currency Arrangements, most of the recipients were in Western Europe. Subsequently, swap lines were also extended to Japan and Mexico. It is not until the financial crisis in 2007 that the Federal Reserve entered into swap arrangements with a wider set of countries.

Institutions involved: Credits from the ESF and credits in the form of Reciprocal Currency Arrangements with the Federal Reserve are also distinct in that a ESF credit is a loan from the Federal Government of the United States to other governments, while swap lines are the provision of short term loans between central banks. However, both types of facilities can provide the emergency US dollar liquidity to an economy that needed it, albeit through different institutions and instruments.

Duration and Frequency: The ESF has been in operation for longer than the Federal Reserve's Reciprocal Currency Arrangements, as the ESF was established with the Gold Reserve Act of 1934, but the Reciprocal Currency Arrangements were first established in 1962. The ESF has been used consistently to make loans to foreign governments since its existence, though no loans have been made from the ESF since August 2002 (Table C.1). Since, the loans from the ESF were for the purposes of stabilization and averting imminent balance of payment crises, all loans from the ESF were typically for 6 months, but could be for up to 12 months, but it needed to be accompanied by a justification by the President to Congress about the "emergency and unique circumstances" that required the term of the

loans (Henning, 1999, pp. 54).[5] In contrast, the Reciprocal Currency Arrangements have been in place consistently between 1962 and 1998, even though they had fallen into relative disuse since 1981 (Bordo et al., 2014). Thereafter, the Federal Reserve swap lines were reinstituted with some central banks in 2007 during the global financial crisis.[6] The swap arrangement that have been established are bilateral in that they are agreements between two central banks, however, they are not reciprocal in nature in that the Federal Reserve cannot draw on them.[7][8] While the duration of the drawings on the swap lines were for 3 months, the arrangements could be for a duration of 12 months, and thereafter require renewal by the Federal Open Market Committee.

Relationship with the IMF: After the creation of the International Monetary Fund (IMF) in December 1945, US government officials envisaged the primary role of stabilization of the monetary system to be taken up my the IMF. In fact, the large majority of the US quota payment to the IMF ($1.8 billion of $2.75 billion) were made from the ESF. Furthermore, in 1976, the Gold Reserve Act was amended that required the Secretary of the Treasury to use the ESF in a manner that is "consistent with the obligations of the Government in the IMF"(Henning, 1999, pp. 23). It was during this time that the US Congress also limited the term of the ESF loans to 6 months or less unless so as to prevent conflict with the functioning and objectives of the IMF. The ESF has often be used to make bridge loans to

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[5]The duration and size of the loans that could be made from the ESF became a significant political controversy in 1995, when the Clinton administration extended a $20 billion loan to Mexico for a period of 5 years. As a result, as per the D'Amato amendment to an "unrelated recession bill" (Henning, 1999, pp. 67), any ESF loans that were greater than "$1 billion and 6 months' duration would require the approval of Congress unless the President certified in writing that a foreign financial crisis threatened 'vital US economic interests' " (Henning, 1999, pp. 69)

[6]This is consistent with the hypothesis in (Eichengreen, 2013) that the Federal Reserve paid greater attention to international aspects of its monetary policy in the 1960s, but this was followed by a period of "benign neglect of the international dimension" (pp. 87).

[7]This is with the exception of the swap arrangements with the Banco de México that have been in place since 1994 and are bilateral in that the Federal Reserve can also draw on them.

[8]In parallel with these swap arrangements, the Federal Reserve also entered into swap agreements that would allow it to borrow foreign currency from these central banks. However, these foreign currency swap agreements were never used (Bordo et al., 2014).

governments that had approached the IMF for emergency financing, but negotiations were still underway of the terms of the IMF loan (McDowell, 2017; Henning, 1999). However, it does not appear that the ESF loans were accompanied by conditionalities, such as the ones that typically accompany loans from the IMF, unless of course they were part of a larger package of assistance along with the IMF.

The Federal Reserve's swap arrangements on the other hand do not appear to have a clear link to the IMF. However, IMF membership and being compliant with the Articles of Agreement has been used in deliberations of whether a swap arrangement should be extended to certain Central Banks. For example, the establishment of a swap arrangement with Japan was slowed down due to the Japanese economy not being compliant with Article VIII of the Articles of Agreement of the IMF, which requires full currency convertibility. However, subsequently, the Federal Reserve System extended a swap arrangement to the Bank of Japan in anticipation of Japan achieving compliance with the IMF Article VIII by the following year (FOMC, 1963). Similarly, one of the reasons cited for not extending a swap line to the Central Bank of Venezuela was that it was not compliant with IMF Article VIII, among others (FOMC, 1965). On the other hand, the Swiss National Bank has had several swap arrangements with the Federal Reserve, the first one effective July 7, 1962, even though Switzerland did not accept Article VIII of the Articles of Agreement of the IMF until 1992, about 30 years later. Therefore, Article VIII does seems not appear to be a strict condition that the FOMC used when deciding which central banks should be included in its swap network.

3.2.4 Determinants of Recipients of Assistance from the ILLR in the Literature

Neither the US Treasury, nor the Federal Open Market Committee clearly outline which governments or central banks are eligible to receive assistance form the ILLR institutions. From a legal standpoint, any ESF loan should meet the following requirements (Munk, 2010):

i. Lending from the ESF should be in keeping with US obligations to the IMF on orderly exchange rate arrangements.

ii. Lending from the ESF should have the requisite Presidential approval.

iii. The term of the loan should be less than 6 months, or would require the President to justify the terms of the loan to Congress.

iv. The ESF loans should have an assured source of repayment.

On the other hand, the report of the Government Accountability Office to the US Congress on the policies put in place during the 2007–2010 global financial crisis outlines that approval of requests for swap agreements with the Federal Reserve were approved based on the "economic and financial mass of the country's economy, a record of sound economic management, and the probability that the swap line would make an economic difference." As a result swap arrangements were put in place with foreign central banks of "important US trading partners or global financial centers" (GAO, 2011, pp. 118). In addition, as per early discussions regarding the countries that should be part of the swap network, being compliant with the Article VIII of the IMF Articles of Agreement appears to have been an important consideration (for example, FOMC (1963) and FOMC (1965)), as mentioned previously.

In both cases, the existing documentation leaves a large degree of ambiguity as to whether there are strict pre-defined criteria regarding which countries can receive emergency liquidity assistance. As a result, the US treasury and the Federal Open Market Committee have substantial discretion in their decision about the recipients of stabilization loans and swap arrangements. There have been some examinations of the selective nature of emergency liquidity assistance provided by the United States in the post-War era. Munk (2010) analyzes the role of the U.S. Treasury Department financing provided to sovereign countries from 1982 to 2010, with great success[9]. Typically, an ESF loan to a sovereign served as a bridge loan

[9]The ESF made a profit, all accrued interest paid, and principal amount repaid (Munk, 2010).

till financing from some other International Financial Institutions like the IMF or World Bank was finalized, or it was part of broader package of financing to the sovereign provided by multiple stakeholders. Loans from the ESF were typically structured as swap agreements, and were predominantly extended to Latin American countries, with some notable exceptions like Philippines (1984), Nigeria (1986), Hungary (1990), Romania (1991), and Liberia (2008), among others. Notably, no loans were extended to any Asian countries during the Asian Financial Crisis, despite extended negotiations between the U.S. Treasury and the Korean Finance Ministry (Munk, 2010).

Schwartz (1997) argues that the use of the ESF to provide dollar loans to other countries to stabilize their currencies comes from trying to ensure their return to the gold standard between 1924 and 1931. However, both Schwartz (1997) and Munk (2010) acknowledge the political nature of the decision that determines whether emergency liquidity assistance is extended to a sovereign borrower. Humpage (2008) also argues that loans from the ESF have a "distinct foreign aid and foreign policy flavor" (pp. 2), giving the example of ESF loans extended to Yugoslavia (1988) and Poland (1990) despite the currencies of these countries being relatively unimportant to the United States. In fact, the US Congress wanted the Secretary of Treasury to extend a longer-term loan to Poland, which was resisted given that they were uncertain about how the government of Poland would repay the loan. However, the Treasury Secretary relented and extended a loan to Poland as a short-term bridge loan once progress had been made on an IMF program (Henning, 1999).

On the other hand, Aizenman and Pasricha (2010) discuss the selective extension of swap lines by the Federal Reserve to other Central Banks during the 2007–2009 financial crisis. The Federal Reserve extended dollar swaps arrangements to the Central Banks of only four emerging markets economies (Banco Central de Brasil, Banco de México, Bank of Korea, and the Monetary Authority of Singapore) and several OECD economies (Reserve Bank of Australia, Bank of Canada, Danmarks National Bank, Bank of England, European Central Bank, Reserve Bank of New Zealand, Norges Bank, Sveriges Riksbank, and the Swiss

National Bank). Aizenman and Pasricha (2010) explores the reasons for this differential access by examining the relative importance of the following factors: US bank exposure to these markets, share of the country in total US trade in 2007, capital account openness, and year since independence or 1800 that the country spent in default or restructuring. They find that exposure of US banks to emerging markets was the most important selection criterion, consistent with the results of McDowell (2017). Specifically, Aizenman and Pasricha (2010) find that all countries that received swap lines from the Federal Reserve had higher shares of US bank exposures as compared to countries that did not received swap lines, with the notable exception of India. Broz (2015) also studies the selection of central banks by the Federal Reserve between 2007 and 2010 and finds that exposure of U.S. banks is the strongest correlate of a central bank receiving a swap line from the Federal Reserve, accounting for 59 percent of the variation. Similarly, Bordo et al. (2014) argue that the the Banco de México was the only developing country central bank among the central banks that had reciprocal currency arrangements with the Federal Reserve in the 1960s and 1970s due to Mexico's "close economic and financial ties with the United States" (pp. 15). Seghezza (2018) also argues that the central banks in countries with the closest link to the US banking system, with massive currency mismatches but low levels of official reserves relative to the currency mismatches received assistance from the Federal Reserve. As far as extension of swap lines to emerging market economies are concerned, (Aizenman et al., 2010b) also highlight the importance of trade links in determining the recipients of swap arrangements, but also of being "fundamentally sound and well-managed emerging market economies" (pp. 17), where sound management included holding a significant pool of foreign exchange reserves.

Given that most Central Banks, including the Federal Reserve, are typically quasi-government institutions that are independent from the executive branch of the government, political motives behind policy actions are typically not attributed to central banks. However, there is a large and rich literature that argues that central banks are not fully technocratic institutions and often have policies that are politically and strategically motivated

(for example, Epstein (2019), Van Der Pijl and Yurchenko (2015), and Tsingou (2014)). The selective extension of swap lines can be seen as another instance of that. Furthermore, time and time again, the global stabilization role played by the Federal Reserve has created domestic political controversy in the United States. For instance, the extension of swap agreements by the Federal Reserve during the global financial crisis created a backlash in the legislature of the United States (Broz, 2015). It prompted Representative Ron Paul of Texas to introduce the "Federal Reserve Transparency Act of 2012", which passed the House of Representatives but not the Senate[10]. Therefore, it is not unfeasible that potential political controversy in the Congress may weigh on the Federal Open Market Committee as they make decisions about whether to have swap agreements with foreign central banks.

There are some recent studies that highlight the politically strategic nature of the Federal Reserve swap lines. Sahasrabuddhe (2019) argues that extension of swap lines to developing economies was "a more selective process" (pp. 462), and on the margin the decision to extend swap lines to some developing economies and not others was a political one. They show that the US banking system had higher exposure to certain economies which did not receive swap lines, notably India, as compared to others that received swap lines during the 2007-2010 Global financial crisis, like Brazil, Singapore, New Zealand, and Switzerland. Similarly, Chey (2013) argues that the extensions of swap lines to emerging market economies during the previous financial crisis was motivated, at least in part, by the need to strengthen the relationship of the United States with key emerging market in order to maintain its influence in global economic governance. Marple (2020) adds to this discussion by arguing that social similarity in terms of similarities in professional backgrounds, similarity in central bankers' speeches, and institutional similarity between central banks contributed to the decision to extend swap agreements, especially in a context of a high degree of uncertainty. Marple (2020) finds that higher the degree of social similarity a central bank has with the Federal

[10]Interestingly, Broz (2015) shows that the Representatives and Senators that voted against this bill were those that received the largest campaign contributions from large U.S. commercial banks.

Reserve, higher is the likelihood that a central bank received a swap line from the Federal Reserve during during the global financial crisis. In this chapter, we also challenge the now conventional wisdom that the identifying of feature of countries that received swap lines from the Federal Reserve are those that had significant US bank exposure. Specifically, it provides the example of Brazil, when it required emergency liquidity in 2001, and had US bank exposure similar to that of South Korea in 2008. However, the Banco Central do Brasil did not receive a swap lines from the Federal Reserve in 2001. Therefore, US bank exposure does not fully explain the recipients of swap lines from the Federal Reserve. What then, according to these studies, explains access to the ILLR for emerging market economies? Chey (2013) emphasizes the importance of the emerging market economies that received swap lines in the G-20 leadership. Brazil was in the annual rotating position of G20 chair in 2008, while this position was occupied by South Korea in 2010. In fact, this paper cites the comments of the US Treasury Secretary in 2008, made on the eve of the first G20 summit, that the Federal Reserve swap lines with 4 emerging market economies was an indicator of strong international cooperation. Singapore, on the other hand, is a member of the exclusive Financial Stability Forum. Similarly, Sahasrabuddhe (2019) shows that the Federal Reserve was more likely to extend a swap arrangement to emerging market economies that shared its policy preference for greater financial openness, had a greater and growing role in forums of global economic governance such as the G-20, and did not raise objections against a US-centric global governance system.

Despite being an institution that is independent from the government, political considerations are known to have affected Federal Reserve policy. For example, political controversy around an ESF loan in 1995 prompted the FOMC to re-evaluate the utility of existing swap arrangements. The decision of the Clinton Administration to use the ESF to extend a $20 billion stabilization loan to the Government of Mexico in 1995 created a significant political controversy. This was because it followed Congress not approving a $40 billion package of economic assistance, as the use of the ESF was at the discretion of the Secretary of the

Treasury (Henning, 1999). Therefore, the extension of the stabilization loan to the government of Mexico was seen in some quarters as the President and the Secretary of Treasury of the United States side-stepping the democratic accountability of the elected representatives of the Congress. The Federal Reserve supplemented the ESF loan by establishing a swap agreement with the Banco de México (Conti-Brown and Zaring, 2019). However, the political controversy surrounding the economic rescue provided to the Mexican economy allowed the FOMC participants that saw Federal Reserve swap lines as anachronistic and as a threat to its independence from the government to recommend the termination of existing swap arrangements. As a result, in 1998, after several years of disuse, all standing swap agreements were allowed to expire, with the exception of the swap agreements with Mexico and Canada under the North American Framework Agreement (Bordo et al., 2014). In the context of foreign exchange intervention being conducted, Humpage (2008) acknowledges that while the US Treasury (which has a distinct legal mandate to intervene in the foreign exchange market) cannot compel the Federal Reserve to intervene in the foreign exchange market when it determines it should, but the Federal Reserve is unlikely to refuse as it has only rarely done so.

Another interesting case study is the absence of ILLR assistance for countries that were worst affected by the Asian Financial Crisis in 1997–1998, especially South Korea that did receive a swap line from the Federal Reserve in 2008. Henning (1999) argues the Clinton administration did not use the ESF to make stabilization loans to Thailand, South Korea, or Indonesia as it was politically difficult to do so after the recent controversy over similar loans made to Mexico in 1995. This was especially the case since as per the D'Amato amendment (that was later allowed to lapse), any loans that were larger than $1 billion for a period longer than 6 months would require Congressional approval. However, Congressional disapproval was something that the Clinton administration did not want to risk (Henning, 1999). Once the D'Amato amendment was not renewed, the US Treasury was prepared to contribute $3 billion of contingent financing as part of the "second line of defense" for the IMF program

in Indonesia. However, this could also be in response to the growing talks and negotiations about creating an Asian Monetary Fund, which US authorities feared would undermine the IMF.

In contrast, the Asian financial crisis does not appear in FOMC meeting minutes in 1997, until December, by when Indonesia, Thailand, and South Korea were already in IMF programs. William McDonough, who at the time was the President of the New York Fed, argued that the economies of East Asia that were in financial trouble had "command economies in which resources are allocated by politicians and bureaucrats and not by the marketplace"(FOMC, 1997, pp. 19-20). According to McDonough, even though the politicians and bureaucrats had successfully managed these economies for a long time, they were unable to respond to changes in the global economy, which had resulted in this crisis. Here he draws a distinction with the Mexican peso crisis, as the political leadership of the Mexico understood "how a market economy behaves" (pp. 20), which he identified as the cause of the recovery from the crisis. He believed that the Asian economies are unlikely to have success that Mexico achieved with assistance from the Federal Reserve. Therefore, even though the possibility of swap arrangements with Thailand, South Korea, or Indonesia were not explicitly discussed in the FOMC in 1997, their unfavorable political orientation in the eyes of the FOMC members meant that they would be disinclined to consider swap arrangements with the central banks of these countries as they believed they would not be successful programs. This is arguably consistent with the hypothesis in Sahasrabuddhe (2019) that the FOMC favored swap agreements with countries that shared its policy preference for financial openness. Alternatively, it is also consistent with the informal criterion that determine which countries received swap arrangements from the Federal Reserve System as per the GAO (GAO, 2011) according to which a swap arrangement should make an economic difference, which perhaps it was already too late to do in December of 1997. It is unsurprising then, in this context, that the countries affected by the Asian Financial Crisis did not receive swap agreements from the Federal Reserve. Therefore, it does appear that several political

economy factors play a role in determining which countries have access to support from the ILLR institutions.

This chapter parses out which factors are most important in this regard in the extension of support from the ILLR between 1980-2018. Based on the literature, we identify the most relevant economic and political factors and examine the role they play in determining which countries received assistance from the Federal Reserve system and from the US Treasury. This builds on the work of Aizenman and Pasricha (2010), McDowell (2017), and Sahasrabuddhe (2019), that analyze the extension of swap agreements by the Federal Reserve during the previous financial crisis, by extending the period under analysis, and focusing greater attention on the international political economy factors. In particular, McDowell (2017) is the only other study to examine which countries received assistance from the US Treasury. To the best of our knowledge, this is the first study to systematically examine the selective extension of ILLR assistance from both the Federal Reserve and the US Treasury taking into account both economic and political factors over a long time period.

3.3 Quantitative Data and Econometric Methodology

This section lays out the data and methodology used to answer the question: what determines access to emergency financial assistance from the United States, either in the form of a central bank swap line or emergency loan arrangement from the Exchange Stabilization Fund of the U.S. Treasury? Do these institutions provide emergency liquidity to the countries that have strong linkages with the U.S. economy, countries that exhibit "good" policy behavior, countries that can help the U.S. further its foreign policy objectives, or some combination thereof?

The data used in this chapter are collected from a variety of sources. The variables included in this study are listed here, and a detailed list of the sources are listed in the Appendix.

Details of the loans extended by the US Treasury through the ESF to foreign governments were obtained from the website of the Treasury Department of the US government. This is presented in Table C.1, which, for the purposes of the econometric analysis is coded as a binary variable that takes the value 1 if a country received a loan in a given quarter, for the duration of the loan, and 0 otherwise. Similarly, details of the swap agreements between the Federal Reserve and the central banks of other countries are listed in Table C.2. For the purposes of the econometric analysis, the countries that received swap lines from the Federal Reserve in a given quarter, for the duration of the loan, and 0 otherwise. These are our key independent variables. Data for both these variables are available from 1962Q1 to present, however, the availability of data of key independent variables are only available for a shorter period of time.

In order to identify the characteristics that made the difference between receiving and not receiving support from the ILLR institutions, we implement a random effects[11] panel logistic model. This takes the following form:

$$Prob(y_{it}|x_{it}, \beta, \mu_i) = \frac{exp(\mu_i + x_{it}^{'}\beta)}{1 + exp(\mu_i + x_{it}^{'}\beta)} \tag{3.1}$$

where y is the binary variable that indicates whether a country i has access to a swap line from the Federal Reserve or whether a country i has a short-term loan from the US Treasury through the ESF in a given quarter t, x_{it} is the vector of our explanatory variables and β is the vector of coefficients of our explanatory variables. The country specific effects, μ_i, are assumed to be normally distributed, that is $\mu_i \sim \mathcal{N}(0, \sigma_\mu^2)$. All continuous variables are in natural logarithmic form.[12]

[11] We do not use a fixed effects model since a fixed effects model would eliminate between country differences and estimate only the within country effects over time, and we are interested in the differential access of countries to the ILLR institutions.

[12] Since some continuous variables in our dataset have negative values, we create a linear positive transformation of those variables of the form $x + c$, where $c = |min(x)| + \epsilon$ and ϵ is a small positive value, before taking the natural logarithm.

In addition to this, we also need to examine how the ILLR institutions respond to contemporary crises. Even though some instances of ILLR assistance, especially from the Federal Reserve have been in place regardless of an imminent crisis, it is likely that most extensions of ILLR assistance is in response to an imminent crisis, that is when emergency liquidity is needed. Therefore, we examine the behavior of the ILLR institutions when a sovereign default, or a currency crisis, or a banking crisis is imminent. We do this by interacting our dependent variables with a crisis variable that takes the value 1 if there is a systemic banking crisis, or currency crisis, or sovereign debt crisis in the previous quarter, and estimating our logit model using these interactions. The data on crises is obtained from Laeven and Valencia (2018).[13] Examining the extension of emergency liquidity in response to a crisis and in normal times is done since, in some cases, we have seen that the Federal Reserve and U.S. Treasury instituted the mechanisms to extend ILLR assistance without any imminent crisis in a precautionary manner, while in others ILLR assistance was only extended in the event of a crisis.

3.3.1 Explanatory Variables

3.3.1.1 Economic Variables

The vector of explanatory variables considered are a series of economic and political variables. As is mentioned in the Section 3.2, Aizenman and Pasricha (2010) and McDowell (2017) discuss the importance of US bank exposure and share of a country's trade in US trade in determining the recipients of the assistance from the Federal Reserve and the ESF. Data of US bank exposure to the each economy as a share of total international exposure of US banks is obtained from the BIS Consolidated Banking Statistics. This data is available quarterly from 1983Q4 to 2019Q4. Similarly, data for the share of a country's exports in

[13]In this dataset, the duration of systemic banking crisis are identified. Therefore our crisis variable takes the value of 1 for the duration of the banking crisis. It does not identify the duration of sovereign debt crisis, but does identify the date of a sovereign debt restructuring. Therefore, we code crisis as 1 for the duration between the beginning of the sovereign debt crisis or currency crisis and sovereign debt restructuring.

US total exports and the share of a country's imports in US total imports are obtained on a quarterly basis from the website of the US Census Bureau. Data is available from 1987Q1 to 2019Q4. Furthermore, we have also included data on countries that have Free Trade Agreements (FTA) with the United States. The United States has FTAs with 20 countries, which are coded as a binary variable that takes the value 1 from the date of signing, and 0 otherwise.

Based on the analysis in Aizenman et al. (2010b), data on foreign exchange reserves as a share of GDP and as a share of external debt are also included. These are only available on an annual basis[14], and are taken from the Global Financial Safety Net database (Scheubel and Stracca, 2016). We also extract data on whether a country is a member of a Regional Financial Arrangement(RFA). Membership in an RFA may be relevant since the formation of some RFAs have been seen as an unwelcome development by some, since it is seen as undermining the position of the IMF. For example, the creation of an Asian Monetary Fund was scuppered in the aftermath of the Asian Financial Crisis in 1997–98 (Park and Wyplosz, 2008). Data on capital account openness, the share of the country's GDP in world GDP and data on whether a country has a swap agreement with the People's Bank of China are also obtained from this database. Similarly, we also have quarterly inflation data from the IMF International Financial Statistics in order to account for sound economic policies, as high and persistent inflation would indicate poor fiscal and monetary policies in an economy.

3.3.1.2 Political Variables

In order to ascertain the importance of political factors and alliances in the determination of ILLR assistance, we also include data on the voting records of countries in the United Nations General Assembly (UNGA). In the political science literature, the voting record in the UNGA are used as one of the standards to measure foreign policy preference of countries.

[14]Given that Aizenman et al. (2010b) argue that the size of foreign exchange reserves relative to GDP and External Debt reflect sound economic management of the external account, which is unlikely to change rapidly, the use of annual data is acceptable.

Bailey et al. (2015) create a measure of "ideal points" that reflect a country's foreign policy preference according to its voting record, while accounting for changes in the UN agenda. These ideal points, estimated using a Item Response Theory statistical model, are able to "consistently capture the position of states vis-à-vis a US-led liberal order" (Bailey et al., 2015, pp. 431), such as the Cold War and the shift in the foreign policy stance of the United States governments towards several Latin American countries after the election of Left-wing governments. Therefore, we include data on the difference between the calculated ideal point of a given country and that of the United States, which is used as our measure of foreign policy alliance with the United States. Similarly, we also include the ideal point difference between a country and that of China. We do so because of the typically differing foreign and economic policy objectives between the governments of the United States and China.

The United States also has several strategic military alliances with other countries and can provide insights into the strategic importance of certain nations to the Military-Industrial complex in the United States. Therefore, we include data on bilateral defense cooperation agreements from the Defense Cooperation Agreement Database, created by Kinne (2019). Bilateral defense cooperation agreements create the legal apparatus that facilitates the signatories' join engagement in joint defense exercises, formulation of coordinated defense policies, and joint production of weapons and technology (Kinne, 2019). While the Defense Cooperation Agreement Database contains data on various types of defense cooperation agreements (DCA), we create a binary variable that codes the existence of any DCA with the United States as a 1, and zero otherwise.

The domestic political and economic conditions in the United States may also play a role in determining whether countries will receive assistance from the ILLR. This is because the key function of the US Treasury is to implement policies to serve the interests of US citizens, and the primary policy objectives of the Federal Reserve is the maximization of US employment subject to maintaining price stability. Therefore, it may be politically difficult for the Treasury Secretary and the FOMC to justify assistance to foreign governments and

Central Banks if the United States economy is facing a downturn. Therefore, we include quarterly data on unemployment that is obtained from the Federal Reserve Economic Data (FRED) produced by the Federal Reserve Bank of St. Louis. Similarly, party alliances of the US President and the Senate and House of Representatives may also play a role in determining which countries, if any, receive assistance from the ILLR. Therefore, we create three binary variables that take the value 1 if the President in office is from the Republican Party, if the Senate is in Republican control, and if the House of Representatives is in Republican control, and zero otherwise.

In our econometric model, we consider the impacts of economic variables and political variables on access to the Federal Reserve and access to the US Treasury in turn, and then consider both sets of variables in determining access to the ILLR institutions. As explained above, we estimate two specifications: one in which the vector of explanatory variables is

$$x_{it} = \begin{bmatrix} \text{Bank exposure} \\ \text{Import share} \\ \text{Export share} \\ \text{Reserves/GDP} \\ \text{Inflation} \\ \text{Ideal point difference with US} \\ \text{Capital Account Openness} \\ \text{US Trade Agreement} \\ \text{Defense Cooperation Agreement with US} \\ \text{US unemployment} \\ \text{Republican President} \\ \text{Republican House} \\ \text{Republican Senate} \\ \text{Emerging Market Dummy} \end{bmatrix} \tag{3.2}$$

and the other in which we interact all explanatory variables with our crisis variable which denotes whether the countries experienced an economic crisis in the previous year, or

$$x_{it} = \begin{bmatrix} \text{Bank exposure*crisis} \\ \text{Import share*crisis} \\ \text{Export share*crisis} \\ \text{Reserves/GDP*crisis} \\ \text{Inflation*crisis} \\ \text{Ideal point difference with US*crisis} \\ \text{Capital Account Openness*crisis} \\ \text{US Trade Agreement*crisis} \\ \text{Defense Cooperation Agreement with US*crisis} \\ \text{US unemployment*crisis} \\ \text{Republican President*crisis} \\ \text{Republican House*crisis} \\ \text{Republican Senate*crisis} \\ \text{Emerging Market Dummy} \end{bmatrix} \tag{3.3}$$

3.4 Descriptive Statistics

Since 1962, the we find several instances of countries receiving assistance from ILLR institutions. Between 1962 and 2002, 27 countries received 93 mostly short-term loans from the ESF in 346 country-quarters, while between 1962 and 2020, 32 countries[15] received assistance from the Federal Reserve through 674 swap agreements with their respective central banks[16]. Figures 3.1 and 3.3 shows the number of countries that have received

[15]This count includes individual Euro Zone countries when the Federal Reserve has a swap agreement with the European Central Bank

[16]Details are presented in Table C.2, each renewal and change in size of line are counted as a new swap agreement.

assistance from the US Treasury and the Federal Reserve since 1962, respectively and Figures 3.2 and 3.4 shows the total volume of loans outstanding from the US Treasury.

Figure 3.1: Number of Countries with loans from the ESF, 1962-2020

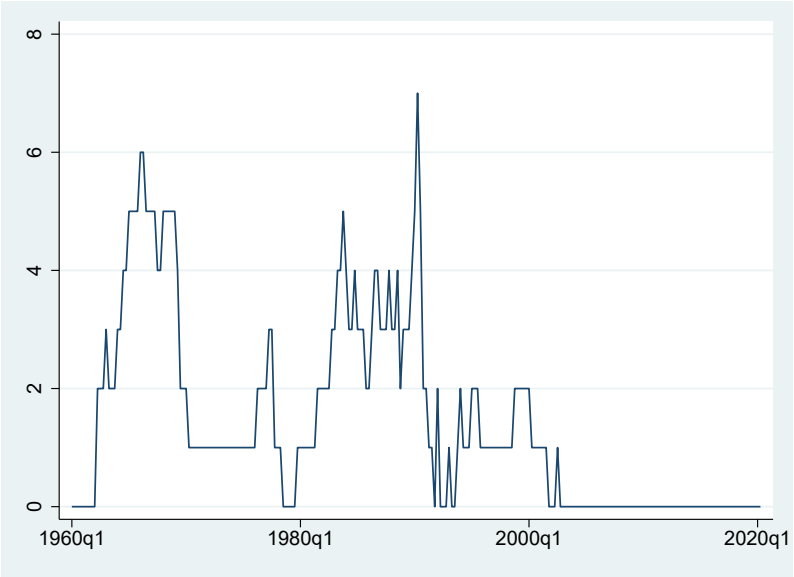


Figure 3.2: Total size of Loans outstanding from the ESF, 1962-2020, millions USD

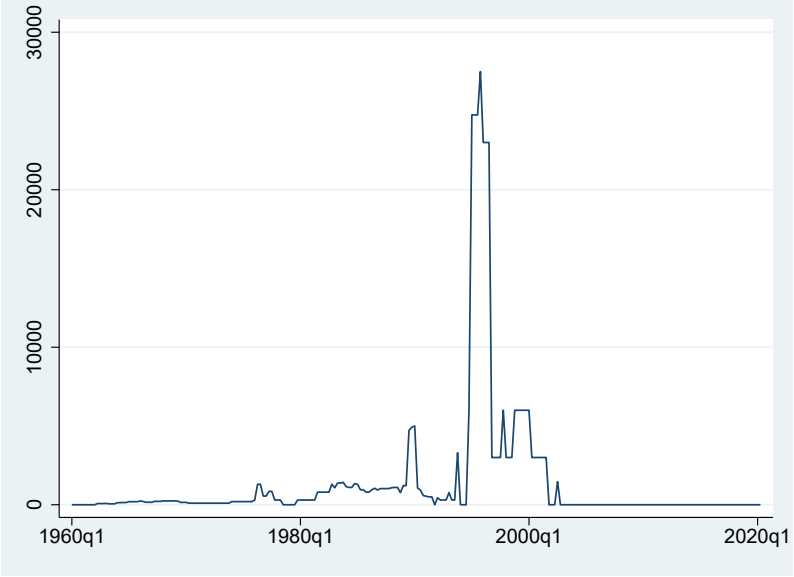


Figure 3.3: Number of Countries with swap lines with the Federal Reserve, 1962-2020

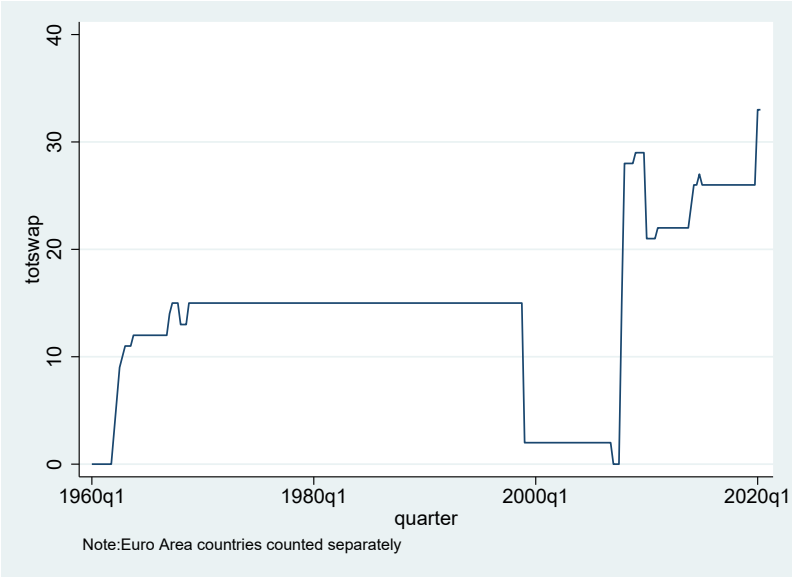
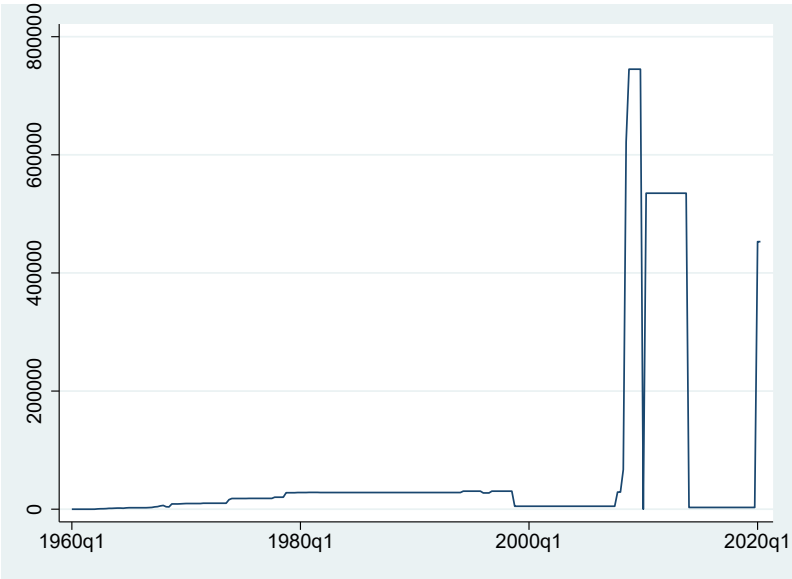


Figure 3.4: Total size of swap agreements with the Federal Reserve, 1962-2020, millions USD



Note: The five swap agreements of unlimited size are excluded from the calculation of total size in a given year

We present the descriptive statistics of our key variables based on whether a country received assistance from the Federal Reserve in Table 3.1 and based on whether a country received assistance from the ESF in Table 3.2. The last column shows results of a t-test to check whether the means are significantly different at the 5 percent level between the two groups, accounting for unequal variances.

Table 3.1: Descriptive Statistics by Recipients of swap lines from the Federal Reserve

	Fed Swap = 1			**Fed Swap = 0**			**Significant difference based on t-test**
Economic Variables							
Variable	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	
Bank Exposure	3.20	4.79	1275	0.58	2.02	12839	Yes
Import Share	3.42	5.36	1987	0.39	1.64	18647	Yes
Export Share	3.71	5.86	1987	0.36	1.31	18647	Yes
Reserves/GDP	6.79	11.98	2190	15.60	18.21	20138	Yes
GDP share	2.43	3.22	2209	0.30	1.24	22569	Yes
Inflation	4.19	10.75	2437	35.85	660.82	19641	Yes
Political Variables							
Ideal point difference w/ U.S.	1.64	0.59	1814	3.03	0.77	20866	Yes
Chinn-Ito Index	0.86	0.22	1981	0.43	0.35	20855	Yes
U.S. Trade Agreements	0.10	0.29	2445	0.04	0.20	25493	Yes
D.C.A.	0.42	0.49	2418	0.11	0.31	23946	Yes
U.S. unemployment	6.37	1.81	2346	6.16	1.67	25082	Yes
Republican President	0.53	0.50	2445	0.59	0.49	25493	Yes
Republican Senate	0.47	0.50	2445	0.49	0.50	25493	Yes
Republican House	0.43	0.50	2445	0.50	0.50	25493	Yes

3.5 Results

Based on the literature, we would expect the signs on our variables across our independent variables shown in Table 3.3.

Table 3.2: Descriptive Statistics by Recipients of loans from the US Treasury

	ESF = 1			**ESF = 0**			**Significant difference based on t-test**
Economic Variables							
Variable	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	
Bank Exposure	5.84	4.18	49	0.84	2.68	14111	Yes
Import Share	4.15	0.43	99	0.69	2.52	20569	Yes
Export Share	5.15	4.66	99	0.70	2.45	20569	Yes
Reserves/GDP	4.61	2.54	172	14.73	17.91	22296	Yes
GDP share	1.18	0.65	172	0.71	2.88	24830	Yes
Inflation	44.83	103.87	150	32.05	623.10	22093	No
Political Variables							
Ideal point difference w/ U.S.	2.68	0.89	180	2.90	0.87	22644	No
Chinn-Ito Index	0.52	0.39	174	0.47	0.37	22810	Yes
U.S. Trade Agreements	0.18	0.38	180	0.05	0.21	28008	Yes
D.C.A.	0.06	0.24	180	0.12	0.32	19508	Yes
U.S. unemployment	6.50	1.63	180	6.18	1.69	27498	Yes
Republican President	0.76	0.43	180	0.58	0.49	28008	Yes
Republican Senate	0.48	0.50	180	0.49	0.50	28008	No
Republican House	0.21	0.41	180	0.49	0.50	28008	Yes

Table 3.3: Expected Signs of Coefficients

Economic Variables		Political Variables	
Variable	**Expected Sign**	**Variable**	**Expected Sign**
Bank Exposure	(+)	Ideal point difference w/ the U.S.	(-)
Import Share	(+)	Chinn-Ito Index	(+)
Export Share	(+)	U.S. Trade Agreements	(+)
Reserves/GDP	(+/-)	D.C.A	(+)
GDP share	(+/-)	U.S. unemployment	(-)
Inflation	(-)	Republican President	(+/-)
		Republican Senate	(+/-)
		Republican House	(+/-)

We would expect bank exposure, trade share, and import share to affect the likelihood of having a swap agreement with the Federal Reserve positively as these indicators would be higher for countries that are of greater importance to the U.S. banking system (Aizenman and Pasricha, 2010; Broz, 2015; McDowell, 2017) and to the U.S. economy in general (GAO, 2011). Similarly, we expect that inflation would negatively impact the likelihood of receiving assistance from the Federal Reserve or the U.S. Treasury as high and persistent inflation can be considered an indicator of poor inflation management by a central bank (Aizenman and Pasricha, 2010). The coefficient on Reserves and GDP share could be either positive or negative. Higher reserves as a share of GDP could indicate either that a central bank or government do not need a swap agreement with the Federal Reserve or a loan from the U.S. Treasury, thereby lowering the likelihood of having a swap agreement or an ESF loan; alternatively, higher reserves could also indicate a higher ability to repay any drawings on a swap line or ESF loan, thereby increasing the likelihood of having a swap agreement. Similarly, a country with higher share of world GDP has greater economic mass in the global economy and therefore is more likely to be important to the U.S. economy (GAO, 2011).

Alternatively, a country with a higher share of world GDP may not need support from the Federal Reserve or U.S. Treasury as much as they perhaps have access to other sources of emergency liquidity.

When considering our political variables, we would expect that the Chinn-Ito Index, U.S. Trade Agreements, and Defense Cooperation Agreements to have a positive impact on the likelihood of receiving assistance from the Federal Reserve or U.S. Treasury. This is because a higher Chinn-Ito index means higher capital account openness which in turn indicates a greater neoliberal orientation of economic policy (Sahasrabuddhe, 2019), and having a Trade Agreement or Defense Cooperation Agreement would indicate greater political importance of an economy to the U.S. economy. We expect the coefficient on Ideal point difference to be negative as greater deviation from the U.S. voting record indicates a higher foreign policy deviation of a national government from that of the United States. We also expect the coefficient on U.S. unemployment to be negative as a higher rate of unemployment in the U.S. would make providing emergency loans to foreign governments and central banks politically unpopular in the United States. It is not immediately clear if we can expect either the Republic party or the Democratic party to be more or less amenable to assisting foreign governments and central banks. Therefore, the impact of these variables could be positive or negative.

3.5.1 Results for Federal Reserve Swap Agreements

Table 3.4 shows the results of our panel logistic model when we consider whether a country had a swap agreement with the Federal Reserve as the dependent variable. Columns (1), (2), and (3) show us the results for the model with economic independent variables, political independent variables, and both economic and political variables, respectively. On the other hand columns (4), (5), and (6) shows the results when we estimate the model with the interaction of our independent variables with our lagged crisis variable. When only economic variables are considered (Column 1), only foreign exchange reserves as a share of GDP is

negatively and significantly correlated with the likelihood of having a swap agreement with the Federal Reserve. Specifically, a 1 percent increase in foreign exchange reserves held by a central bank as a share of GDP reduces the log odds of having a swap agreement with the Federal Reserve by 1.68. From Column 2, we can see that the political variables on their own do not determine the access to Federal Reserve swap lines. However, when we consider both sets of variables together, several of our coefficients become significant. A higher share of imports in total US imports, higher capital account openness, having a defense cooperation agreement with the United States, and higher US unemployment increases the likelihood of a country having a swap agreement with the Federal Reserve. On the other hand, a higher share of exports in total US exports and foreign exchange reserves as a share of GDP decrease the likelihood of receiving a swap agreement. Furthermore, swap lines are less likely to be extended by a Republican President, a Republican Senate, and a Republican House. From the results in Column 3, it appears the the size of the impact of our political variables on the likelihood of receiving a swap line from the Federal Reserve is larger than that of our economic variables, with the exception of foreign exchange reserves.

Table 3.4: Regression Results for Federal Reserve Swap Lines

				Interacted with Crisis Variable		
	(1)	(2)	(3)	(4)	(5)	(6)
	Economic	Political	Both	Economic	Political	Both
Bank Exposure	-0.010		0.544	0.016		0.460
	(0.346)		(0.344)	(0.339)		(0.334)
Import Share	0.579		1.033**	0.511		1.003*
	(0.568)		(0.451)	(0.654)		(0.563)
Export Share	-0.458		-1.348***	-0.459		-1.343***
	(0.435)		(0.346)	(0.408)		(0.356)
FX Reserves	-1.683***		-2.035***	-1.406**		-2.069***
	(0.585)		(0.527)	(0.585)		(0.581)
GDP Share	-1.836		-0.012	-1.448		0.512
	(1.170)		(0.567)	(1.049)		(0.654)
Inflation	-7.266		0.706	-26.497***		-8.784
	(9.204)		(0.826)	(9.742)		(6.882)
Ideal point difference		-3.441	-1.085		-4.304	-0.670
w/ U.S.		(23.000)	(1.335)		(.)	(1.469)
Capital Account		0.770	2.992**		1.473	2.987**
Openness		(10.385)	(1.214)		(0.973)	(1.456)
U.S. Trade		-0.275	0.775		1.610	2.029**

Agreement		(18.946)	(0.985)		(22.566)	(0.963)
D.C.A		-0.735	2.175*		-0.181	1.519
		(9.239)	(1.214)		(7.754)	(1.456)
U.S. unemployment		3.640	2.537***		2.515	2.157**
		(13.532)	(0.749)		(.)	(0.861)
Republican		-1.115	-2.321***		-1.625	-2.509***
President		(3.661)	(0.552)		(3.525)	(0.609)
Republican		-0.657	-0.701**		0.222	-0.583
Senate		(2.175)	(0.345)		(.)	(0.364)
Republican			-1.476***		-2.484	-1.697***
House			(0.419)		(3.142)	(0.530)
Emerging Market	2.622	-1.018	-2.590	2.621	-2.763	-4.602**
Dummy	(7.163)	(67.868)	(1.659)	(7.674)	(.)	(1.861)
Bank Exposure*				1.741*		2.082***
Crisis				(0.943)		(0.540)
Import Share*				-0.511		-0.178
Crisis				(0.863)		(0.584)
Export Share*				0.778		2.609***
Crisis				(0.629)		(0.706)
FX Reserves*				-3.203***		-5.395***
Crisis				(1.084)		(0.990)
GDP Share*				-2.278		-3.845***
Crisis				(1.785)		(0.729)
Inflation*				21.583**		10.441
Crisis				(9.002)		(6.813)
Ideal point difference					2.934	-12.284***
w/ U.S.*Crisis					(.)	(4.224)
Capital Account					-0.202	1.823
Openness* Crisis					(.)	(1.564)
U.S. Trade					0.789	0.291
Agreement*Crisis					(.)	(1.871)
D.C.A* Crisis					-0.566	0.730
					(3.339)	(1.218)
U.S. unemployment*					3.702	6.712***
Crisis					(.)	(2.447)
Republican					0.094	-1.598
President*Crisis					(.)	(1.479)
Republican					3.095	3.013***
House*Crisis					(.)	(0.898)
Republican					-0.824	-2.858
Senate*Crisis					(.)	(1.808)
Emerging Market				-4.482*	3.047	8.846***
Dummy*Crisis				(2.359)	(.)	(1.974)
Constant	20.463	-12.473	-5.958	106.786**	-8.901	38.457
	(43.088)	(36.840)	(4.985)	(45.973)	(.)	(31.676)
N	10682	20936	8776	10682	20936	8776

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results in columns (4), (5), and (6) should be interpreted as follows: the coefficient of the interaction term is the additional impact of that variable on the log odds of having a

swap agreement if there is an economic crisis in the previous quarter. Therefore, the total impact of any given variable on the log odds would be the sum of the coefficient on the variable under consideration and the coefficient on the interaction between that variable and the lagged crisis variable. When we interact all our variables with our lagged crisis variable, we find that, similar to the results in Column (1), economic variables alone do not appear to explain access to the Federal Reserve swap lines. The impact of foreign exchange reserves as a share of GDP is even larger than we previously estimated, as a 1 percent increase in foreign exchange reserves in the previous quarter reduces the log odds of having a swap arrangement with the Federal Reserve by 4.61 (-1.406 + -3.203). Our inflation variable becomes significant, and 1 percent increase in inflation reduces the log odds of having a swap agreement by 4.91. Interestingly, the coefficient on our bank exposure variable also becomes significant, but at the 10 percent level. Significant. Similar to our results in Column (4), political variables alone do not explain access to the swap lines, even when we interact them with our lagged crisis variable. In Column (6), on the other hand, we find that several of our political variables are large and significant. Specifically, an increase in capital account openness by 1 percent increase the log odds of having a swap agreement with the Federal Reserve by 2.99, a trade agreement with the United States increases the log odds of a swap agreement by 2.03, and and a 1 percent increase in US unemployment increases the log odds by 8.87. On the other hand, deviation from voting record of the United States in the United Nations General Assembly (Ideal point difference), a Republican President lowers the log odds of a swap agreement with the Federal Reserve by 12.24 and 2.51, respectively, while a Republican House raises the log odds by 1.32.

Our economic variables also become significant in Column (6). Specifically, consistent with the literature, we find that a 1 percent increase in bank exposure increases the log odds of having a swap agreement with the Federal Reserve by 2.08. Similarly, a 1 percent increase in export share is correlated with an increase in the log odds by 1.27. The coefficient on our inflation variable is not longer significant. The coefficient on foreign exchange reserves

continues to negative and significant: a 1 percent increase in reserves as a share of GDP in the previous quarter is associated with a decline in log odds by 7.46. Interestingly, our GDP share variable is also significant, and a 1 percent increase is share of GDP in world GDP decreases the log odds of receiving a swap line by 3.85. Interestingly, in Column 6, the emerging market economies were more likely than other economies to have an swap agreement with the Federal Reserve.

Once we account for the occurrence of crises, we find that bank exposure is important in determining access to Federal Reserve swap lines. The importance of a country in the trade portfolio also appears to play a role in determining access, with higher export share increasing the likelihood of having a swap agreement with the Federal Reserve. Contrary to the hypothesis in Aizenman, we consistently find that reserve accumulation actually reduces the likelihood of receiving a swap line. This result is not surprising, as it may indicate reverse causation even though we use lagged values: central banks that do not expect to receive assistance from ILLR institutions have probably increased the long-term accumulation of foreign exchange reserves. Furthermore, despite the claims of technocratic and apolitical decision making by central banks, our political variables do appear to play a significant role in determining whether a country receives a swap line from the Federal Reserve. US Trade agreements and the party composition of the US government plays an important role. Interestingly, the coefficient on US unemployment is positive and significant across specifications, contrary to our expectations. An explanation of this could be that the increasingly global nature of several economic crisis, and that the need for swap agreements in other countries may coincide with economic downturn in the United States. However, since there is no obvious tradeoff between the Federal Reserve responding to domestic unemployment and extending a swap agreement to another central bank, it appears that the Federal Reserve does extend swap agreements even if domestic unemployment is high. Alternatively, it could also be the case that the Federal Reserve seeks to support the world economy in order to maintain or expand U.S. exports, especially when domestic unemployment is high.

3.5.2 Results for Loans from the Exchange Stabilization Fund

Table 3.5 shows the results of our panel logit model when we consider whether a country received a loan from the Exchange Stabilization Fund of the US Treasury as the dependent variable. As in Table 3.4, columns (1), (2), and (3) show us the results for the model with economic independent variables, political independent variables, and both economic and political variables, respectively. Additionally, columns (4), (5), and (6) shows the results when we estimate the model with the interaction of our independent variables with our lagged crisis variable. When we consider our economic variables alone as determinants of receiving a loan from the US Treasury, only the coefficients on foreign exchange reserves and GDP Share is negative and significant at the 10 percent level of significance. However, unlike the results in Table 3.4, we find that several political variables play an important role in determining whether a country will receive an ESF loan, when only political variables are considered in our model. Specifically, an increase in the the deviation of a country's voting record in the UNGA from that of the United States, U.S. unemployment, and a Republican House reduces the likelihood of receiving a loan from the Exchange Stabilization Fund. Counterintuitively, having a defense cooperation agreement with the U.S. also lowers the likelihood of receiving a ESF loan. On the other hand, having a trade agreement with the United States, a Republican President and a Republican House increases the likelihood of receiving an ESF loan. However, when we consider both economic and political variables, the coefficient on bank exposure becomes positive and significant, and the coefficient on GDP share becomes negative and significant. Interestingly, the coefficient on our foreign exchange reserves variable is no longer significant. The coefficients on deviation of a country's voting record from that of the United States in the UNGA, defense cooperation agreement variable, and the variables that measure the party composition of the US government are no longer significant. However, having a trade agreements with the United States continues to have a positive and significant impact on the likelihood of receiving an ESF loan, and unemployment

in the United States has a negative and significant impact on the likelihood of receiving an ESF loan.

Table 3.5: Regression Results for ESF Loans

				Interacted with Crisis Variable		
	(1)	(2)	(3)	(4)	(5)	(6)
	Economic	Political	Both	Economic	Political	Both
Bank Exposure	-0.190		0.693*	-0.423		0.504**
	(0.545)		(0.397)	(0.608)		(0.241)
Import Share	0.481		0.389	0.747		0.062
	(0.554)		(0.396)	(0.804)		(0.208)
Export Share	0.952		0.521	1.233*		0.335
	(0.608)		(0.655)	(0.745)		(0.478)
FX Reserves	-1.616*		-1.632	-2.413		-2.465
	(0.875)		(1.041)	(2.032)		(2.381)
GDP Share	-0.925*		-1.426**	-1.235*		-0.737***
	(0.499)		(0.601)	(0.663)		(0.238)
Inflation	-1.031		-1.379	0.954*		2.033*
	(0.848)		(1.047)	(0.538)		(1.130)
Ideal point difference		-2.611**	3.153		-4.856***	-1.523
w/ the U.S.		(1.276)	(2.140)		(1.834)	(2.478)
Capital Account		0.063	-0.256		-0.138	-0.522
Openness		(0.319)	(0.366)		(0.344)	(0.794)
U.S. Trade		1.447***	3.245***		0.638	8.728
Agreement		(0.552)	(0.519)		(0.733)	(5.330)
D.C.A		-2.343***	1.029		1.496	3.470*
		(0.712)	(1.817)		(1.284)	(1.869)
U.S. unemployment		-4.659***	-9.608***		-6.415***	-5.362**
		(1.221)	(3.645)		(2.071)	(2.650)
Republican		1.720*	-0.066		2.044**	-0.437
President		(0.921)	(0.927)		(0.858)	(1.349)
Republican		-2.728***	-2.668**		-3.460***	
House		(0.597)	(1.344)		(1.341)	
Republican		1.870***	1.095		1.855**	
Senate		(0.390)	(0.869)		(0.747)	
Emerging Market	2.415	3.497***	1.770	2.881	4.271**	-0.933
Dummy	(1.501)	(1.192)	(1.541)	(1.897)	(1.770)	(3.384)
Bank Exposure*				0.457		0.033
Crisis				(0.834)		(0.647)
Import Share*				-0.009		0.317
Crisis				(0.866)		(0.727)
Export Share*				-0.632		1.186
Crisis				(1.014)		(1.190)
FX Reserves*				1.781		1.429
Crisis				(1.861)		(2.496)
GDP Share*				0.718		-0.788
Crisis				(0.808)		(0.584)
Inflation*				-2.751**		-3.382***
Crisis				(1.188)		(1.139)
Ideal point difference					7.248**	6.057

w/ the U.S.*Crisis					(3.501)	(4.455)
Capital Account Openness*Crisis					0.403 (0.535)	0.392 (1.143)
U.S. Trade Agreement*Crisis					0.000 (.)	0.000 (.)
D.C.A.*Crisis					0.000 (.)	0.000 (.)
U.S. unemployment* Crisis					3.529 (3.578)	-2.237 (4.171)
Republican President*Crisis					-1.234 (1.081)	2.311* (1.180)
Republican House*Crisis					1.229 (2.185)	
Republican Senate*Crisis					-0.022 (0.880)	
Emerging Market Dummy*Crisis				-2.334 (1.716)	-2.000* (1.036)	0.820 (3.876)
Constant	-1.003 (4.528)	0.018 (2.281)	12.872** (5.686)	-9.975*** (2.952)	4.136 (3.971)	-2.817 (2.267)
N	2939	12584	2812	2939	11580	2371

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When we interact all our variables with our lagged crisis variable, we find that, the coefficient of export share is positive and significant at the 10 percent level of significance. Furthermore, we can see that the impact of GDP share and inflation is negative and significant in Column (4). In Column (5) we find that several political variables play a role in determining whether a country receives a loan form the ESF. Specifically, we find that deviation from the United States voting record in the UNGA, unemployment in the US, and the party composition of the governments are important in order to determine whether a country receives a loan from the ESF. Counterintuitively, our results suggest that a greater deviation of a country's voting record from that of the US increases the likelihood of receiving a loan from the ESF. On the other hand, a Republican President and Senate increases the log odds by 2.04 and 1.85, respectively. However, a Republican House reduces the log odds of receiving an ESF loan by 3.24. A Republican House lowers the log odds of an ESF loan by 3.46. Furthermore, a one percent increase in unemployment in the United States reduces the log odds of receiving a loan from the ESF by 6.42.

Column (6) shows the results of our model when we consider both economic and political variables interacted with our lagged crisis variable. Interestingly, when all relevant variables are considered, bank exposure once again becomes positive and significant. Specifically, a 1 percent increase in bank exposure leads to a 0.50 increase in the log likelihood of receiving a loan from the ESF. Furthermore, a 1 percent increase in GDP share is associated with a 0.74 decline in the log odds of receiving a loan from the ESF. The presence of inflation in a potential recipient nation also reduces the probability of receiving an ESF loan: a 1 percent increase in inflation is associated with a decline of log odds by 1.35. A defense cooperation agreement with the United States increases the log odds of receiving an ESF loan by 3.47 units, and 1 percent increase in unemployment in the United States is associated with a 5.36 units decline in the log odds of receiving an ESF loan. Finally, a Republican President increases the log odds of receiving an ESF loan by 2.31.

These results are interesting in several respects. Bank exposure continues to play an important role in determining access to this ILLR institution. Although, the size of its impact on the likelihood of receiving a loan from the ESF is relatively low as compared to the other factors we considered. Similarly, inflation plays a negative and significant role in determining access to the ESF, although, once again, the size of its impact is relatively small. In comparison, the impact of our political variables is larger in comparison. Furthermore, an increase in unemployment in the United States consistently reduces the likelihood of receiving an ESF loan. It is important to note that it is not the case that there is any trade-off between the funds of the US Treasury being used to stimulate the domestic economy and the ESF being used to make loans to foreign governments since the ESF is a self-financed fund that is earmarked for very specific uses. Nonetheless, a rise in unemployment in the United States likely makes it politically difficult to justify making loans to foreign governments when there is a downturn in the US economy. Contrary to our findings in Table 3.4, a Republican President is more likely to use the ESF to make loans to foreign governments across specifications.

3.5.3 Results for Federal Reserve Swap Agreements or loans from the Exchange Stabilization Fund

Table 3.6 shows the results of our panel logit model when we our dependent variable takes the value 1 if a country has a swap agreement with the Federal Reserve or if a country received a loan from the ESF in a given quarter. As before, columns (1), (2), and (3) show us the results for the model with economic independent variables, political independent variables, and both economic and political variables, respectively. Columns (4), (5), and (6) shows the results when we estimate the model with the interaction of our independent variables with our lagged crisis variable. Similar to the results in Tables 3.4 and 3.5, none of the economic or political variables are significant on their own, with the exception of foreign exchange reserves. When we only considered our economic independent variables in our model, we find that a percent increase in the reserves to GDP ratio reduces the log likelihood of receiving support from either of the ILLR institutions by 1.71 units. When we consider both economic and political variables together, we find that the coefficients on our bank exposure variable and import share variable become positive and significant. Furthermore, the coefficient on the export share variable becomes negative and significant. As before, the reserves variable continues to be negatively a significantly related to the likelihood of receiving assistance from the ILLR institutions. Once again, a defense cooperation agreement is associated with 1.72 higher log odds of receiving assistance from the ILLR institutions. Furthermore, higher unemployment in the U.S. increases the log odds, while Republicans in the Presidency, the Senate, and the House lower the log odds of assistance from the ILLR institutions.

Table 3.6: Regression Results for Federal Reserve Swap Lines or ESF Loans

				Interacted with Crisis Variable		
	(1) Economic	(2) Political	(3) Both	(4) Economic	(5) Political	(6) Both
Bank Exposure	0.032		0.594**	0.039		0.468*
	(0.334)		(0.291)	(0.336)		(0.263)
Import Share	0.574		0.828**	0.570		0.772
	(0.551)		(0.408)	(0.660)		(0.506)
Export Share	-0.489		-1.269***	-0.477		-1.250***
	(0.428)		(0.327)	(0.402)		(0.322)

FX Reserves	-1.706***		-2.133***	-1.422**		-2.042***
	(0.575)		(0.501)	(0.586)		(0.540)
GDP Share	-1.856		0.052	-1.534		0.536
	(1.158)		(0.469)	(1.186)		(0.567)
Inflation	-6.264		-1.017	-20.875**		-6.912
	(6.350)		(1.322)	(9.513)		(4.733)
Ideal Point difference		-3.140	-1.970		-3.730	-1.603
w/ the U.S.		(138.692)	(1.409)		(28.564)	(1.526)
Capital Account		0.299	1.044		0.484	1.337
Openness		(9.029)	(0.691)		(10.651)	(1.155)
U.S. Trade Agreement		-0.082	1.098		0.999	1.692*
		(14.654)	(0.963)		(18.920)	(1.025)
D.C.A		-0.728	1.724*		-0.869	1.453
		(4.219)	(1.042)		(8.040)	(1.312)
U.S. unemployment		3.423	2.288***		3.252	2.056***
		(159.271)	(0.698)		(10.501)	(0.774)
Republican		-0.854	-2.139***		-0.759	-2.263***
President		(4.385)	(0.461)		(4.067)	(0.535)
Republican			-1.426***			-1.646***
House			(0.373)			(0.475)
Republican			-0.727**			-0.613*
Senate			(0.343)			(0.352)
Emerging Market	2.381	0.096	-2.726*	1.440	-0.221	-4.254**
Dummy	(7.152)	(1.737)	(1.645)	(9.056)	(520.386)	(1.661)
Bank Exposure*				1.312**		1.181**
Crisis				(0.669)		(0.496)
Import Share*				-0.644		-0.346
Crisis				(0.902)		(0.609)
Export Share*				0.515		1.770***
Crisis				(0.614)		(0.648)
FX Reserves*				-2.661***		-2.833***
Crisis				(0.861)		(0.846)
GDP Share*				-1.307		-2.695***
Crisis				(1.340)		(0.606)
Inflation*				14.306		2.082
Crisis				(8.903)		(4.284)
Ideal point difference					3.549	-5.948***
w/ the U.S.*Crisis					(30.158)	(1.577)
Capital Account					0.175	-0.619
Openness*Crisis					(12.914)	(1.454)
U.S. Trade Agreement					0.837	2.961
					(77.550)	(2.384)
DCA* Crisis					-0.055	1.856**
					(.)	(0.811)
U.S. unemployment*					0.383	0.631
Crisis					(19.721)	(3.506)
Republican					0.126	-0.179
President*Crisis					(6.772)	(0.894)
Republican						1.975***
House*Crisis						(0.742)
Republican						-3.985*
Senate*Crisis						(2.112)

Emerging Market Dummy*Crisis				-1.388	0.499	5.141***
				(1.142)	(43.043)	(1.678)
Constant	16.084	-10.990	3.116	81.325*	-10.519	30.666
	(30.159)	(.)	(6.813)	(45.881)	(129.268)	(21.773)
N	10682	20936	8776	10682	20936	8776

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When we estimate our model with our political variables interacted with crisis variables, none of the coefficients are significant. However, when we consider the economic variables interacted with the crisis variable (Column 4), we find that the a 1 percent increase in bank exposure increases the log odds of receiving assistance from the ILLR institutions by 1.31 units. Furthermore, we find that a 1 percent increase in reserves as a share of GDP reduces the log odds of support from the ILLR institutions by 4.08 units. Similarly, an increase in inflation also reduces the likelihood of having a swap line with the Federal Reserve or of receiving a loan from the ESF.

Column 6 shows the results of the model when we use all our economic and political variables interacted with the crisis variable as independent variables. The bank exposure variable is positive and significant, and our results show that a 1 percent increase in bank exposure leads to a 1.65 increase in log odds of receiving support from the ILLR institutions. Our trade variables are also important, as a 1 percent increase in export share leads to a 0.52 unit increase in the log odds of having access to the ILLR institutions. As in the other columns, we also find that an increase in reserves reduces the likelihood of receiving support from the Federal Reserve or the US Treasury. We also find that having a trade agreement with the United States and having a defense cooperation agreement with the United States increases the likelihood of receiving ILLR assistance. However, a Republican President and a Republican Senate lowers the likelihood of receiving assistance from the ILLR institutions. Finally, our results indicate that a 1 percent increase in the unemployment rate in the United States increases the log odds of having access to the ILLR institutions by 2.06 units.

3.5.4 Robustness Checks

We check whether these results are robust to alternate specifications by estimating a panel probit model and a linear probability model with random effects. The results are presented in Tables C.3 and C.4, respectively, in Appendix II. It is important to note that the sizes of the coefficients in the logit model are not comparable to the ones in the probit and linear probability model, given that there are very different assumptions about the nature of the data generating process underlying these models. However, when we consider our logit results for the extension of Federal Reserve Swap Lines, we find that in most instances, the signs of this coefficients are consistent across out logit, probit, and linear probability models. The exceptions are the that the positive and significant coefficient on the import share variable in Columns (3) and (6) in Table 3.4 and the negative and significant coefficient on the Republican Senate variable in Column (3). The positive and significant coefficient on the Export share variable in Column (6) in Table 3.4 becomes negative and significant in the linear probability model, even though it is also positive and significant in the probit model. Similarly, while the negative and significant coefficient on the GDP share variable is also seen in the probit model, it is not significant in the linear probability model. The logit coefficients on all political variables, with the exception of the coefficient on the Republican Senate variable, are robust to the alternative probit and linear probability specifications.

When we consider the coefficients in the logit results for the determinants of the recipients of ESF loans in Table 3.5 and in the probit model in Table C.3 and in the linear probability model in Table C.4, we can see that, once again, most of our coefficients have the same sign across all three models. Furthermore, the coefficients that are statistically significant in the logit model are also statistically significant in the probit model, except the coefficient of the GDP share variable. The coefficients of all the political variables that are statistically significant in the logit model are also significant in the probit model. However, when we consider the linear probability model, only some of the coefficients are statistically significant:

the coefficients on US bank exposure, GDP share, Inflation, US unemployment are not significant.

Finally, when we consider the logit coefficients in Table 3.6, for the model in which we consider the determinants of receiving any support from either ILLR institutions, we find all coefficients that are statistically significant in the logit model are also statistically significant in the probit and linear probability model, with the exception of coefficients on import share and GDP Share. The coefficient on export share in Columns (3) and (6) in Table 3.6 maintain their sign and significance in our probit model, but the sign changes in the linear probability model.

3.5.5 Summary of Results

Figure 3.5 graphically shows the marginal impacts of the results in Column 6 of Tables 3.4, 3.5, and 3.6 for the likelihood of having a swap agreement with the Federal Reserve, receiving a loan from the Exchange Stabilization Fund of the U.S. Treasury, or either having a swap agreement or receiving a loan from the ESF, respectively. Please note that Figure 3.5 shows the marginal impacts of our variables while the Tables 3.4, 3.5, and 3.6 show the log odds of a percent change in our independent variables. The confidence intervals around the marginal effects are shown at the 10, 5, and 1 percent level of significance.

Table 3.7 summarizes the results from our different models. It identifies the direction of the impact of our variables on the likelihood of having a swap agreement with the Federal Reserve or receiving a loan from the Exchange Stabilization Fund of the U.S. Treasury and whether the coefficients were statistically significant as per our panel logit model, and the cells that are shaded gray are the results that are robust to our alternative panel probit and linear probability models.

Figure 3.5: Marginal Effects of Variables on Probability of Assistance from the Lenders of Last Resort

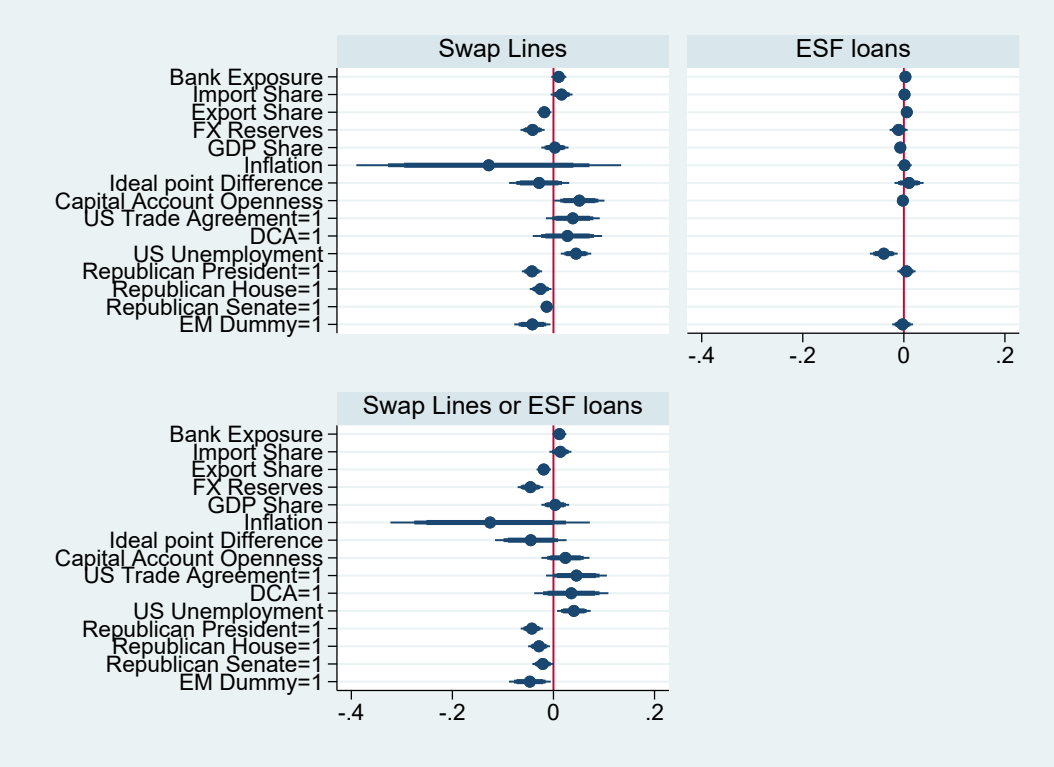


Table 3.7: Summary of Regression Results

Variable	**Swap Agreement**	**ESF Loan**	**Swap Agreement or ESF Loan**
Economic Variables			
Bank Exposure	Positive and Significant	Positive and Significant	Positive and Significant
Import Share	Positive and Significant		
Export Share	Positive and Significant		Positive and Significant
Reserves/GDP	Negative and Significant		Negative and Significant
GDP share	Negative and Significant	Negative and Significant	Negative and Significant
Inflation		Negative and Significant	
Political Variables			
Ideal point difference w/ the U.S.	Negative and Significant		Negative and Significant
Chinn-Ito Index	Positive and Significant		
U.S. Trade Agreements	Positive and Significant		Positive and Significant
D.C.A.		Positive and Significant	Positive and Significant
U.S. unemployment	Positive and Significant	Negative and Significant	Positive and Significant
Republican President	Negative and Significant	Positive and Significant	Negative and Significant
Republican Senate			Negative and Significant
Republican House	Positive and Significant		Positive and Significant
Emerging Market Dummy	Positive and Significant		Positive and Significant

3.6 Intertemporal comparison of Recipients of ILLR suppport

There are several countries in our database that have received ILLR support when they needed it in some instances and not in others. For instance, while the Bank of Korea had a swap agreement with the Federal Reserve in October 2008 and again in March 2020, it did not have a swap agreement with the Federal Reserve during the East Asian Crisis in 1998. Similarly, the Argentine government received support from the US Treasury through the ESF on several occasions in 1995, 1988, 1987, 1985, and 1968, but did not receive assistance from the ESF or the Federal Reserve before or during its sovereign debt crises in and after 2002. This differential treatment allows us to further examine the factors that are important in determining the circumstances in which governments and central banks have access to the ILLR institutions, and acts as another robustness check of our results. Table 3.8 lists the countries that had a swap agreement with the Federal Reserve in some circumstances and not in others.

Table 3.8: Countries that had a swap agreement with the Federal Reserve in one or more instances, and not in others

Country	**Year of Crisis**	**Type of Crisis**	**Notes**
Brazil	1982	Currency Crisis	The Banco Central do Brasil received a swap agreement from the Federal Reserve in October 2008, April 2009, and March 2020
	1987	Currency Crisis	
	1990	Banking Crisis	
	1992	Currency Crisis	
	1994	Banking Crisis	
	1999	Currency Crisis	
Estonia	1992	Currency Crisis and Banking Crisis	Estonia received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
Finland	1991	Banking Crisis	Finland received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
	1993	Currency Crisis	
Greece	1983	Currency Crisis	Greece received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
Latvia	1992	Currency Crisis	Latvia received a swap agreement from the Federal
	1995	Banking Crisis	

			Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
Lithuania	1992	Currency Crisis	Lithuania received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
New Zealand	1984	Currency Crisis	New Zealand received a swap agreement from the Federal Reserve in October 2008 and March 2020
Slovak Republic	1998	Banking Crisis	Slovak Republic received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
Slovenia	1992	Banking Crisis	Slovenia received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU
South Korea	1997	Banking Crisis	South Korea received a swap agreement from the Federal Reserve in October 2008 and March 2020
	1998	Currency Crisis	
Spain	1983	Currency Crisis	Spain received a swap agreement from the Federal Reserve in December 2007, September 2008, May 2010, and February 2014 as part of the EU

Of the countries that received ILLR assistance from the Federal Reserve mentioned in Table 3.8, most countries later received a swap agreement with the Federal Reserve by virtue of becoming members of the European Union. Therefore, the most interesting cases are those of Brazil, South Korea, and New Zealand. In all three cases, the central banks did not have swap agreements with the Federal Reserves during past crises, but did receive assistance from the Federal Reserve later during the global financial crisis and during the Coronavirus pandemic, even though there did not appear to be an imminent financial crisis taking shape in any of these countries at the time.

From the results in Table 3.4, it is clear that bank exposure, export share, GDP share, foreign exchange reserves, capital account openness, trade agreements with the United States,

defense cooperation agreements with the United States, US unemployment, and the party composition of the government of the United States play a role in determining which countries are likely to have a swap agreement with the Federal Reserve. Therefore, it is instructive to examine the evolution of these variables in the countries that had swap agreements with the Federal Reserve during the global financial crisis and afterwards, but not during an earlier crisis.

Specifically, the primacy of exposure of the US banking system in determining the existence of a swap agreement with the Federal Reserve is often discussed in the literature. However, if we examine the evolution of the banking exposure share in South Korea, New Zealand, and Brazil over time, as we do in Figure 3.6, we can see that the share of exposure of US banks as a share of their total foreign exposure was higher in all these countries when their Central Banks had higher US bank exposure relative (and would have needed support from the ILLR) to when their Central Banks did have a swap agreement with the Federal Reserve. Furthermore, these importance of these countries as destinations for U.S. exports also appears to be lower when the Central Bank of a country received a swap line from the Federal Reserve relative to when it did not, as is evident from Figure 3.7. However, this is not the case when we consider exports to Brazil, as exports to Brazil constituted a higher share of total US exports at the time the Banco Central do Brasil received a swap line relative to when it did not. Furthermore, while we do not have trade data for the first two quarters of 2020, the share of exports to South Korea as a share of total US exports trended upwards after 2012.

Figure 3.8 shows us the trend in capital account openness as measured by the normalized Chinn-Ito index. Interestingly, the trend in capital account openness exhibits an increasing trend in South Korea after 1999, with the Chinn-Ito index being much higher in 2008 (when the Bank of Korea did have a swap line with the Federal Reserve) onwards relative to 1997 (when the Bank of Korea did not have a swap line with the Federal Reserve). This is also the case for New Zealand and Brazil (except for in 2020).

Figure 3.6: US Bank Exposure Share, %

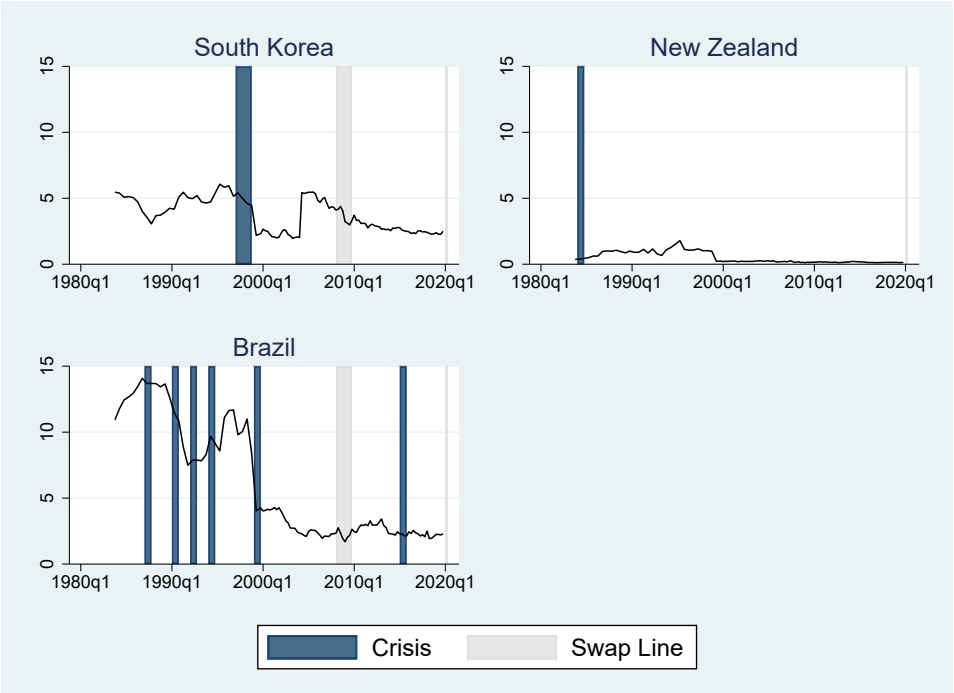
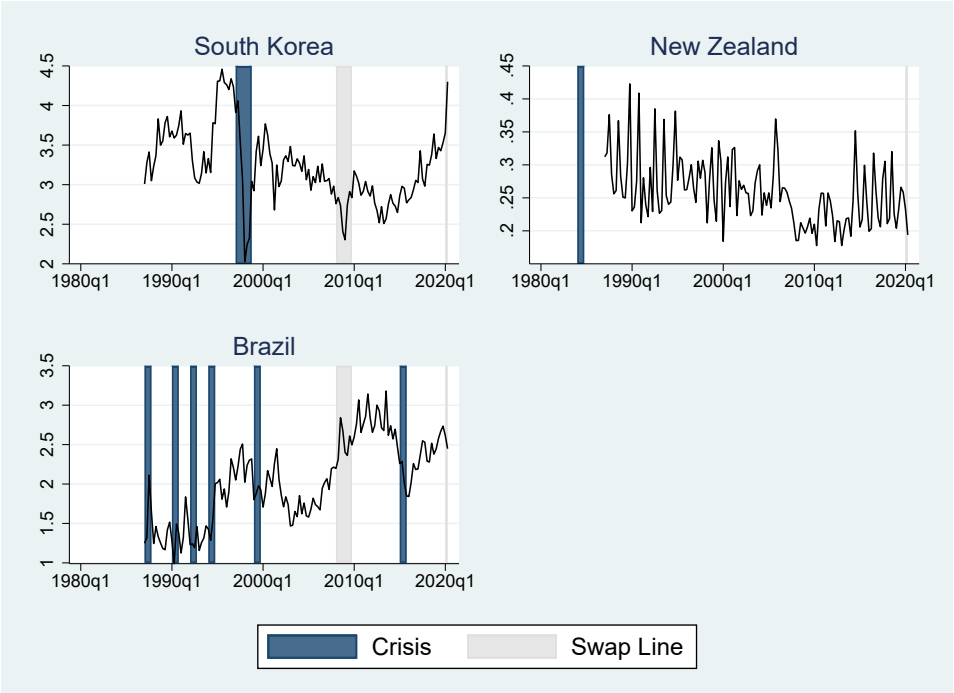


Table 3.9 shows the descriptive statistics of our significant variables in Table 3.4 in two cases: two years or eight quarters prior to having a swap agreement with the Federal Reserve and two years or eight quarters prior to the beginning year of a financial crisis when the country did have a swap agreement with the Federal Reserve. The countries considered here are South Korea, New Zealand, and Brazil. Interestingly, we find that US bank exposure is on average lower when their central banks had a swap agreement with the Federal Reserve relative to when they did not. This is also the case for the average countries' share in US exports, but the difference is not significant. Also, in contradiction with the results in Table 3.4, on average these countries had a significantly higher level of reserves as a share of GDP immediately prior to receiving a swap agreement relative to when these countries did not receive a swap agreement.

These descriptive statistics once again confirm the importance of our political variables. On average, these countries had greater capital account openness prior to receiving swap

Figure 3.7: US Export Share, %



Note: The y axes for the different country charts are not the same

Figure 3.8: Capital Account Openness measured by Chinn-Ito Index

agreements with the Federal Reserve relative to when they did not. The logit regression results in Table 3.4 found that higher U.S. unemployment was correlated with a higher likelihood of receiving a swap agreement. However, within this smaller sample, we find that the opposite is the case: US unemployment was lower when the central banks of these countries received swap agreements relative to when they did not. Furthermore, a Republican President and Republican Senate were more likely to be in office when these central banks received swap agreements with the Federal Reserve, contrary to our logit regression results.

Table 3.9: Descriptive Statistics by Recipients of swap lines from the Federal Reserve Countries in one or more instances, and not in others

	Fed Swap = 1			**Fed Swap = 0 & Crisis = 1**			**Significant difference based on t-test**
Variable	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	
Bank Exposure	2.30	1.45	40	6.15	3.34	25	Yes
Export Share	2.24	1.13	40	2.39	1.12	40	No
Reserves/GDP	17.21	6.92	28	6.11	4.19	48	Yes
GDP share	1.82	0.68	28	1.98	0.96	48	No
Ideal Point Difference w/ the U.S.	2.73	0.43	16	2.75	0.73	48	No
Chinn-Ito Index	0.48	0.06	16	0.20	0.19	48	Yes
U.S Trade Agreement	0.275	0.45	40	0	0	48	Yes
US unemployment	4.11	0.44	40	6.68	1.66	48	Yes
Republican President	1	0	40	0.42	0.50	48	Yes
Republican Senate	0.8	0.41	40	0.42	0.50	48	Yes
Republican House	0.5	0.51	40	0.5	0.51	48	No

Table 3.10 lists the countries that received a loan from the Exchange Stabilization Fund of the US treasury in some circumstances and not in others. Similar to Table 3.9, Table 3.11 shows the descriptive statistics of our significant variables in Table 3.5 in two cases: two years or eight quarters prior to receiving an ESF loan from the US Treasury and two years or eight quarters prior to the beginning year of a financial crisis when the country did not receive an ESF loan from the US Treasury. The countries considered here are the ones listed in Table 3.10.

Table 3.10: Countries that received a loan from the ESF in one or more instances, and not in others

Country	**Year of Crisis**	**Type of Crisis**	**Notes**
Argentina	2002	Currency Crisis	Argentina received ESF loans in March 1995, October 1988, February 1988, October 1987, March 1987, June 1985,

			December 1984, March 1984, May 1968, May 1967, and June 1962
Costa Rica	1981	Currency Crisis	Costa Rica received an ESF loan in May 1990
Ecuador	1999	Currency Crisis	Ecuador received an ESF loan in December 1987
Guyana	1992	Currency Crisis	Guyana received an ESF loan in June 1990
	1993	Banking Crisis	
Jamaica	1991	Currency Crisis	Jamaica received an ESF loan in December 1983
Nigeria	1997	Currency Crisis	Nigeria received an ESF loan in October 1986
Peru	1981	Currency Crisis	Peru received an ESF loan in March 1993
	1983	Banking Crisis	
	1988	Currency Crisis	
Philippines	1997	Banking Crisis	Philippines received ESF loans in October 1984 and May 1962
	1998	Currency Crisis	
Uruguay	1990	Currency Crisis	Uruguay received an ESF loan in August 2002
	1983	Currency Crisis	
	1981	Banking Crisis	
Venezuela	2002	Currency Crisis	Venezuela received ESF loans in March 1990, March 1989, and March 1968

Several other countries, such as Colombia, Chile, Dominican Republic, Nicaragua, and Yugoslavia also fall into this group. They have been left out of this table since they received a loan from the ESF prior to 1980 for which we do not have most relevant comparative data.

The data in Table 3.11 confirms the results of our logit regression when we consider the exposure of US banks to these countries. Specifically, the average exposure of US banks in these countries was higher immediately prior to receiving an ESF loan relative to when these countries did not receive an ESF loan. However, contrary to our logit regression results, the countries in Table 3.10 had a higher share of world GDP immediately prior to receiving an ESF loan relative to when they did not receive an ESF loan. None of these countries had trade agreement with the United States, and interestingly, none of these countries had a defense cooperation agreement with the United States when they received an ESF loan. Interestingly, these countries received an ESF loan when US unemployment was higher relative to when they did not receive an ESF loan, and Republican President was more likely to be in office when these countries received an ESF loan relative to when they did not receive an ESF loan.

Table 3.11: Descriptive Statistics by Recipients of ESF loans in one or more instances, and not in others

	ESF = 1			**ESF = 0 & Crisis = 1**			**Significant difference based on t-test**
Variable	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	
Bank Exposure	2.33	2.23	46	1.13	1.21	40	Yes
GDP share	0.35	0.32	111	0.17	0.21	103	Yes
Inflation	175.97	824.41	56	43.52	28.59	80	No
US Trade Agreement	0	0	111	0	0	0	
DCA	0	0	111	0.09	0.28	91	Yes
US unemployment	6.90	1.63	111	5.87	1.28	103	Yes
Republican President	0.91	0.29	111	0.46	0.50	103	Yes
Republican Senate	0.37	0.48	111	0.35	0.48	103	No

The discussion in this section complicates the picture of the determinants of the recipients of emergency assistance from the international lenders of last resort in the form of swap agreements or U.S. dollar loans. These descriptive results provide a note of caution to our regression results. It may reflect a kind of hysteresis: once the ILLR institutions decide to extend support to a specific economy, the evolution of the specific variables identified here may matter less. This could reflect a situation in which something very dramatic has to change geo-politically for a country to then be informally disqualified for support. For instance, even though Venezuela received several emergency loans from the U.S. Treasury prior to 1990, the diplomatic relationship between the United States and Venezuela worsened dramatically with the election of Hugo Chavez in 1999. Therefore, the Venezuelan government would be an unlikely candidate for a loan during the currency crisis of 2002. This section does confirm that the decision to extend ILLR support is the result of a complex geo-political process, and not a simple straightforward one as the literature has suggested thus far.

3.7 Conclusions

During the Eurozone crisis, the then President of the European Central Bank, Mario Draghi famously announced that "within our mandate, the ECB is ready to do whatever it takes to preserve the Euro." The announcement in July 2012 and the policy actions that are followed are widely believed to have created the conditions for stabilizing the financial markets in Europe. However, these policy actions and the dollar support that the European Central Bank provided to banks in its jurisdiction was supported by the ECB drawing on its swap agreement with the Federal Reserve. However, not all central banks have the ability to do whatever it takes to stabilize a national financial system that has significant dollar liabilities, unless they have access to the international lender of last resort institutions.

This chapter shows that only some countries have had access to international lender of last resort institutions, namely, the Federal Reserve through Reciprocal Currency Arrangements, and the US Treasury through the Exchange Stabilization Fund. And this access depends on a variety of economic and political factors. Countries that US banks have greater exposure to, countries that have a higher share in US exports, countries that have lower foreign exchange reserves, and countries that have a trade agreement or a defense cooperation agreement with the United States are more likely to have a swap agreement with the Federal Reserve. Furthermore, countries are more likely to have a swap agreement when US unemployment is high (potentially, an indicator of increasingly global nature of economic crises), and when Democratic President or Republican House is in power. Similarly, countries that US banks have greater exposure to, a lower share of world GDP, low inflation, a trade agreement or a defense cooperation agreement with the United States are more likely to receive a loan from the Exchange Stabilization Fund (ESF) of the U.S. Treasury. Our results also show that countries are more likely to receive a loan from the ESF when unemployment in the US is low, and when a Republican President or Republican Senate is in office.

Our analysis confirms the importance of US bank exposure, as has been previously discussed in the literature. However, when we examine the trends in bank exposure in countries

that received swap agreements in one instance but not in others, bank exposure appears less important, since the average US bank exposure to these countries were actually lower when they had a swap agreement with the Federal Reserve relative to when they did not. When we examine the trend in bank exposure in countries that received loans from the ESF, the importance of bank exposure is confirmed. Therefore, we have mixed results in the relative importance of economic variables in explaining selective extension of support from the International Lender of Last Resort (ILLR) institutions. However, the importance of our political variables is confirmed when we analyze their trends in periods in which countries received loans from the ESF relative to when they did not.

Therefore, not only do ILLR institutions exercise discretion in which countries to assist and which countries to not assist, this discretion also depends to a large extent on political factors that have nothing to do with effective conduct of economic policy, but more to do with forging political alliances with the United States. Therefore, the issuers of the global reserve currency, namely our ILLR institutions are playing a key role in reinforcing several foreign policy goals of the United States. An alternative, but not necessarily incompatible, explanation is that the importance of financial openness and diplomatic connections reflects a desire on the part of U.S. policymakers in keeping many recipient economies open or further opening up recipient economies as destinations of trade and investment from the United States.

This matters because the implication is that the stability of the global financial system, the ultimate responsibility of which can only be on the ILLR institutions, depends on political importance of certain countries to policymakers in the United States and on the political and economic stability within the United States. This exposes the global financial system to important sources of instability: whether the newest venue or source of global financial instability has sufficient political allegiance to the United States. The selective extension of emergency liquidity support from the ILLR institutions also raises concerns about the United States influencing national economic and foreign policy orientation of other coun-

tries, or underwriting or backstopping a certain neoliberal policy orientation, specifically as regards openness of the capital account. The selective extension and its political motivation can also be with a view to opening up new avenues and destination of production, trade, and investment for U.S. firms and financial actors. It is plausible, then, that a major financial crisis resulting from a dollar shortage that can be resolved quickly and efficiently by intervention from the Federal Reserve or the U.S. Treasury may not be resolved due to, for instance, foreign policy positions of the governments of the economies involved. Alternatively, it might create incentives among policymakers to move their policy orientation into one that the Federal Reserve and U.S. governments finds amenable, which is not necessarily the optimal policy choice for the economy in question. The implication is that the public good provided by a lender of last resort internationally is contingent on several political factors making the Federal Reserve and the U.S. Treasury only possible lender of last resort, but one that is unreliable for most countries, save a few. Therefore, the global monetary US dollar system has several sources of instability unless there is genuine internationalization of lender of last resort institutions or there is organic movement to a new global reserve currency. Both of these prospects appear highly unlikely.

APPENDIX A

APPENDIX TO CHAPTER I

A.1 Appendix A: Details of Variables Used

Variable	**Description**	**Source**
Reserves/GDP	Total Reserves Excluding Gold, US Dollars as a percentage of Nominal GDP in current US dollars	International Financial Statistics
Reserves(including gold)/GDP	Total Reserves including gold, US Dollars, as a percentage of Nominal GDP in current US dollars	International Financial Statistics
Total Reserves in months of imports	Total Reserves including gold divided by average monthly imports	International Financial Statistics
Short-term Debt to Reserve Ratio	Short Term Debt of maturity of one year or less as a share of total Reserves including gold	International Financial Statistics
Interest Rate	Interest rate on short-term government securities, percent per annum	International Financial Statistics
Chinn-Ito Index	Chinn-Ito index of capital account openness normalized between 0 (completely closed capital account) and 1 (completely open capital account)	Chinn and Ito (2006a)
RFA	Membership in Regional Financial Arrangement. 1 if member of any RFA, and 0 otherwise	Scheubel and Stracca (2016)
Swap	Indicates whether country has swap line from a central bank or multilateral swap agreement. 1 if swap agreement, 0 otherwise	Scheubel and Stracca (2016)
Fed Swap	Indicates whether country has swap line from the Federal Reserve. 1 if swap agreement, 0 otherwise	Scheubel and Stracca (2016)
ECB Swap	Indicates whether country has swap line from the ECB. 1 if swap agreement, 0 otherwise	Scheubel and Stracca (2016)
PBOC Swap	Indicates whether country has swap line from the PBOC. 1 if swap agreement, 0 otherwise	Scheubel and Stracca (2016)
BOJ Swap	Indicates whether country has swap line from the BOJ. 1 if swap agreement, 0 otherwise	Scheubel and Stracca (2016)
BOE Swap	Indicates whether country has swap line from the BOE. 1 if swap agreement, 0 otherwise	Scheubel and Stracca (2016)

A.2 Appendix B: Country Classification

Emerging Market Economies		
Brazil	Chile	China
Colombia	Czech Republic	Egypt
Hungary	India	Indonesia
Malaysia	Mexico	Morocco
Peru	Philippines	Poland
Russia	South Africa	Thailand
Turkey		
Non-Emerging Developing Economies		
Afghanistan	Algeria	Angola
Argentina	Aruba	Bahamas
Bahrain	Bangladesh	Barbados
Belize	Bhutan	Bolivia
Botswana	Brunei	Burundi
Cambodia	Cameroon	Cape Verde
Central African Republic	Chad	Comoros
Congo	Costa Rica	Cuba
Democratic Republic of Congo	Djibouti	Dominica
Dominican Republic	Ecuador	El Salvador
Equatorial Guinea	Eritrea	Ethiopia
Fiji	Gabon	Gambia
Ghana	Grenada	Guatemala
Guinea	Guyana	Haiti
Honduras	Hong Kong	Iran
Iraq	Israel	Jamaica
Jordan	Kenya	Kuwait
Laos	Lebanon	Lesotho
Liberia	Macao	Madagascar
Malawi	Maldives	Mauritania
Mauritius	Micronesia	Mongolia
Mozambique	Myanmar	Namibia
Nepal	Nicaragua	Nigeria
Oman	Pakistan	Panama
Papua New Guinea	Paraguay	Qatar
Rwanda	Saint Lucia	Saint Vincent & the Grenadines
Samoa	São Tomé & Príncipe	Saudi Arabia
Seychelles	Sierra Leone	Singapore
Solomon Islands	Somalia	South Korea
Sri Lanka	Sudan	Suriname
Swaziland	Syria	Tanzania
Tonga	Trinidad & Tobago	Tunisia
Uganda	United Arab Emirates	Uruguay
Vanuatu	Venezuela	Vietnam
Yemen	Zambia	Zimbabwe
Advanced Economies		
Albania	Antigua & Barbuda	Armenia
Australia	Austria	Azerbaijan

Belarus	Belgium	Bosnia & Herzegovina
Bulgaria	Canada	Croatia
Cyprus	Czech Republic	Denmark
Estonia	Finland	France
Georgia	Germany	Greece
Hungary	Iceland	Ireland
Italy	Japan	Kazakhstan
Kosovo	Kyrgyz Republic	Latvia
Lithuania	Luxembourg	Macedonia
Malta	Moldova	Montenegro
Netherlands	New Zealand	Norway
Poland	Portugal	Romania
Russia	Saint Kitts & Nevis	San Marino
Slovak Republic	Slovenia	Spain
Sweden	Switzerland	Tajikistan
Timor	Turkmenistan	Ukraine
United Kingdom	United States	Uzbekistan

Note: The classification into "Emerging Market Economies" is based on S&P Emerging Markets Core Index, while the classification into "Developing Economies" is based on 2014 Classification by the United Nations, which can be found here. The remaining countries are classified as "Advanced Economies"

APPENDIX B

APPENDIX TO CHAPTER II

B.1 Appendix A

Table B.1: Full List of Variables Used and their Sources

Variable	**Source**	**Notes**
Gross Capital Inflows as a share of GDP	IMF International Financial Statistics and Lane and Milesi-Ferreti (2017)	Dependent Variable; Change in Total Liabilities
Gross Capital Outflows as a share of GDP	IMF International Financial Statistics and Lane and Milesi-Ferreti (2017)	Dependent Variable; Change in Total Assets
Net Capital Inflows as a share of GDP	IMF International Financial Statistics and Lane and Milesi-Ferreti (2017)	Dependent Variable; Gross Capital Inflows − Gross Capital Outflows
External Debt as a share of GDP	IMF International Financial Statistics and Lane and Milesi-Ferreti (2017)	Dependent Variable
Short-term External Debt as a share of GDP	IMF International Financial Statistics and Lane and Milesi-Ferreti (2017)	Dependent Variable
Currency Crisis	Laeven and Valencia (2018)	Dependent variable; 1 if first year of currency crisis; 0 otherwise
Systemic Banking Crisis	Laeven and Valencia (2018)	Dependent variable; 1 if first year of systemic banking crisis; 0 otherwise
Sovereign Debt Crisis	Laeven and Valencia (2018)	Dependent variable; 1 if year of sovereign default; 0 otherwise
Reserves as a share of GDP	IMF International Financial Statistics and Lane and Milesi-Ferreti (2017)	Independent Variable; Foreign exchange reserves excluding gold reserves
Volatility	Website of Chicago Board Options Exchange	Control Variable; calculated as rolling standard deviation of closing values of the daily S&P 500 Index for each year
Commodity Index	IMF International Financial Statistics	Control Variable; Global Primary Commodity Price index
Real GDP per capita	World Bank World Development Indicators	Control Variable; constant 2010 US dollars

Real GDP	World Bank World Development Indicators	Control Variable; constant 2010 US Dollars
Real GDP growth	World Bank World Development Indicators	Control Variable; rate of growth of Real GDP
Chinn-Ito Index	Chinn and Ito (2006b)	Normalized de-jure index of Capital account openness; $0 <$ Chinn-Ito Index < 1, where 1 indicates fully free capital mobility
Interest Rate	IMF Monetary and Financial Statistics	Short-to-medium term Government bond yields per annum
Exchange Rate Regime	Ilzetzki et al. (2017)	Categorical variable varying from 1 (fixed exchange rate) to 6 (freely falling exchange rate)
Cross-border claims of BIS reporting banks on residents of a country	Bank of International Settlements Locational Banking Statistics	Instrumental variable; scaled by GDP

B.2 Appendix B

Table B.2: Country Classification based on Per-capita Income

Low Income Countries			
Benin	Burkina Faso	Ethiopia	Mali
Nepal	Niger	Senegal	Togo
Lower-Middle Income Countries			
Angola	Bangladesh	Cote d'Ivoire	Ghana
India	Kyrgyz Republic	Moldova	Mongolia
Morocco	Myanmar	Pakistan	Papua New Guinea
Philippines	Solomon Islands	Sri Lanka	
Upper-Middle Income Countries			
Armenia	Botswana	Bulgaria	Fiji
Malaysia	Maldives	Mauritius	Mexico
Romania	Russia	South Africa	Thailand
Venezuela			
High Income Countries			
Australia	Austria	Belgium	Canada
Cyprus	Czech Republic	Denmark	Finland
France	Germany	Greece	Hungary
Iceland	Ireland	Italy	Japan
Republic of Korea	Lithuania	Luxembourg	Malta
Netherlands	New Zealand	Poland	Portugal
Seychelles	Singapore	Slovak Republic	Slovenia
Spain	Sweden	Switzerland	United Kingdom
United States			

Table B.3: Country Classification based on World-Bank Lending Category

IDA			
Bangladesh	Benin	Burkina Faso	Cote D'Ivoire
Ethiopia	Ghana	Kyrgyz Republic	Maldives
Mali	Myanmar	Nepal	Niger
Senegal	Solomon Islands	Togo	
Blend			
Fiji	Moldova	Mongolia	Pakistan
Papua New Guinea			
IBRD			
Angola	Armenia	Botswana	Bulgaria
India	Malaysia	Mauritius	Mexico
Morocco	Philippines	Poland	Romania
Russia	Seychelles	South Africa	Sri Lanka
Thailand	Venezuela		
No Classification			
Australia	Austria	Belgium	Canada
Cyprus	Czech Republic	Denmark	Finland
France	Germany	Greece	Hungary
Iceland	Ireland	Italy	Japan

Republic of Korea	Lithuania	Luxembourg	Malta
Netherlands	New Zealand	Portugal	Singapore
Slovak Republic	Slovenia	Spain	Sweden
Switzerland	United Kingdom	United States	

B.3 Appendix C

Table B.4: Impact of Relative Reserve Accumulation on Net Capital Inflow

	(1) Fixed Effects	(2) Difference GMM	(3) System GMM	(4) System GMM w/ IV
l1.$Z_{reserves}$	0.0358	0.0475***	-0.0702	-0.0614
	(0.0261)	(0.0125)	(0.0666)	(0.0600)
l2.$Z_{reserves}$	-0.0231	-0.0315*	-0.0166	-0.0175
	(0.0242)	(0.0167)	(0.0263)	(0.0288)
l3.$Z_{reserves}$	-0.0092	-0.0081	-0.0125	-0.0162
	(0.0179)	(0.0169)	(0.0194)	(0.0197)
l4.$Z_{reserves}$	0.0081	0.0036	0.0070	0.0060
	(0.0315)	(0.0171)	(0.0259)	(0.0277)
l5.$Z_{reserves}$	0.0067	0.0135	-0.0090	-0.0076
	(0.0219)	(0.0134)	(0.0210)	(0.0222)
Consistent	0.0016	0.0027	-0.0037	-0.0050
	(0.0047)	(0.0060)	(0.0074)	(0.0069)
Volatility	-0.0085	-0.0033	-0.0016	-0.0009
	(0.0175)	(0.0024)	(0.0027)	(0.0025)
Commodity Index	0.0003	0.0002***	0.0002	0.0001
	(0.0003)	(0.0000)	(0.0001)	(0.0001)
per-capita Income	-0.0489	-0.0179	-0.0396	0.0114
	(0.0387)	(0.0164)	(0.0607)	(0.0225)
GDP growth	0.0556	0.0050	0.0315	0.0509
	(0.0487)	(0.0300)	(0.0487)	(0.0469)
Chinn-Ito Index	0.0421	0.0603***	-0.0343	-0.0344
	(0.0257)	(0.0132)	(0.0544)	(0.0548)
Interest Rate	-0.0007	0.0001	0.0012	0.0015
	(0.0009)	(0.0007)	(0.0018)	(0.0016)
Exchange Rate	0.0260*	0.0354***	0.0370	0.0097
	(0.0151)	(0.0085)	(0.0248)	(0.0168)
ER Regime	0.0010	0.0019	-0.0039	-0.0020
	(0.0035)	(0.0032)	(0.0129)	(0.0108)
Constant	-0.8602	-0.8769***	-1.5472**	-2.0332***
	(0.5544)	(0.2213)	(0.6637)	(0.3679)
N	980	902	1040	1013

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the Fixed Effects model, five lags of the dependent variable are also used as controls

Table B.5: Impact of Relative Reserve Accumulation on Relative Net Capital Inflow

	(1) Fixed Effects	(2) Difference GMM	(3) System GMM	(4) System GMM w/ IV
l1.$Z_{reserves}$	0.117	0.169**	-0.362	-0.278
	(0.104)	(0.068)	(0.316)	(0.293)
l2.$Z_{reserves}$	-0.017	-0.055	0.016	0.010
	(0.091)	(0.090)	(0.089)	(0.105)
l3.$Z_{reserves}$	-0.052	-0.032	-0.056	-0.051
	(0.079)	(0.091)	(0.105)	(0.111)
l4.$Z_{reserves}$	-0.067	-0.084	-0.064	-0.062
	(0.105)	(0.093)	(0.114)	(0.109)
l5.$Z_{reserves}$	0.089	0.172**	-0.005	0.014
	(0.101)	(0.073)	(0.096)	(0.099)
Consistent	-0.005	0.018	-0.094**	-0.098**
	(0.028)	(0.033)	(0.043)	(0.043)
Volatility	-0.180	0.016	0.003	0.006
	(0.120)	(0.013)	(0.023)	(0.023)
Commodity Index	0.003	0.001***	0.001	0.000
	(0.002)	(0.000)	(0.001)	(0.000)
Per-capita Income	-0.175	0.001	-0.047	0.058
	(0.200)	(0.090)	(0.292)	(0.153)
GDP growth	0.458*	0.367**	0.320	0.308
	(0.243)	(0.164)	(0.271)	(0.245)
Chinn-Ito Index	0.105	0.315***	-0.213	-0.254
	(0.094)	(0.070)	(0.196)	(0.189)
Interest Rate	0.000	0.009**	0.017	0.017
	(0.005)	(0.004)	(0.011)	(0.011)
Exchange Rate	0.072	0.109**	0.087	0.047
	(0.052)	(0.045)	(0.152)	(0.110)
ER Regime	-0.009	0.015	-0.097	-0.085
	(0.016)	(0.017)	(0.084)	(0.072)
Constant	4.147	-2.402**	-1.271	-2.072
	(2.529)	(1.068)	(3.437)	(2.389)
N	980	902	1040	1013

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the Fixed Effects model, five lags of net capital inflows are also used as controls

Table B.6: Quantile Regression results for Net Capital Inflows

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Quantile	10th	20th	30th	40th	50th	60th	70th	80th	90th
l1.logreserves	-0.0031***	-0.0012***	-0.0004***	-0.0002***	-0.0000***	-0.0002***	-0.0007***	-0.0019***	-0.0013**
	(0.0002)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)	(0.0003)	(0.0006)
l2.logreserves	0.0021***	0.0002**	0.0001**	0.0001***	0.0000***	0.0003**	0.0015***	0.0020***	0.0003
	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0003)	(0.0004)	(0.0005)
l3.logreserves	0.0005**	0.0005***	0.0000	0.0000	0.0000	-0.0002**	-0.0008***	-0.0019***	0.0017**
	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0003)	(0.0003)	(0.0007)
l4.logreserves	-0.0001	0.0002	0.0002*	-0.0000	0.0000	0.0000	-0.0004	0.0005	0.0013**
	(0.0004)	(0.0002)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0003)	(0.0003)	(0.0005)
l5.logreserves	-0.0002	-0.0001	-0.0002**	0.0001***	-0.0000	0.0000	0.0007***	0.0014***	-0.0011***
	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)	(0.0004)
Consistent	0.0014***	0.0008***	0.0003***	0.0001**	-0.0000	0.0001***	0.0010***	0.0067***	0.0012
	(0.0002)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0002)	(0.0007)	(0.0020)
Volatility	-0.0000	0.0000***	0.0000***	0.0000	0.0000***	0.0000	0.0000***	0.0000***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Per-capita Income	-0.0010***	-0.0004***	-0.0001***	-0.0001***	-0.0000***	-0.0000	-0.0003***	0.0000	-0.0037***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)
GDP growth	0.0079***	0.0045***	0.0030***	0.0006***	-0.0000***	-0.0017***	-0.0078***	-0.0030	0.0114**
	(0.0020)	(0.0003)	(0.0003)	(0.0001)	(0.0000)	(0.0004)	(0.0012)	(0.0022)	(0.0050)
Chinn-Ito Index	0.0022***	-0.0003	0.0005***	0.0004***	0.0000***	0.0004***	0.0024***	0.0008**	0.0056***
	(0.0002)	(0.0002)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0003)	(0.0004)	(0.0007)
Interest Rate	0.0002**	0.0001***	0.0000***	-0.0000	0.0000	-0.0000***	-0.0000	-0.0001***	-0.0002***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Exchange Rate	0.0013***	0.0003***	0.0002***	0.0001***	0.0000***	-0.0000	0.0001	-0.0006***	-0.0011***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
ER Regime	0.0012***	0.0001***	0.0001***	-0.0001***	-0.0000***	-0.0001***	-0.0006***	-0.0014***	-0.0033***
	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)
N	1175	1175	1175	1175	1175	1175	1175	1175	1175

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX C

APPENDIX TO CHAPTER III

C.1 Appendix A

Table C.1: ESF Loans to Foreign Governments, 1962–present

Country	**Signing Date**	**Amount, millions USD**	**Multilateral /Bilateral**	**First Drawn**	**Fully Repaid /Expired**
Uruguay	August 2002	1466	B	08/05/2002	08/09/2002
Mexico	December 2000	3000	B	not used	12/01/2001
Mexico	December 1999	3000	B	not used	12/01/2000
Mexico	December 1998	3000	B	not used	12/01/1999
Brazil	December 1998	5000	M	12/18/1998	04/12/2000
Mexico	December 1997	3000	B	not used	12/01/1998
Mexico	December 1996	3000	B	not used	12/01/1997
Mexico	December 1995	3000	B	not used	12/01/1996
Argentina	March 1995	250	M	05/04/1995	12/01/1995
Mexico	February 1995	20000	B	03/14/1995	01/16/1997
Mexico	January 1995	1500	B	not used	02/21/1995
Mexico	August 1994	3000	M	not used	12/30/1994
Mexico	April 1994	3000	B	01/09/1995	01/29/1996
Macedonia	February 1994	5	M	not used	02/22/1994
Mexico	March 1994	3000	B	not used	04/26/1994
Mexico	January 1994	300	B	not used	04/26/1994
Mexico	November 1993	3000	B	not used	03/30/1994
Peru	March 1993	470	B	03/18/1993	03/18/1993
Panama	January 1992	143	B	01/31/1992	03/11/1992
Mexico	January 1992	300	B	not used	01/12/1994
Romania	March 1991	40	M	03/07/1991	03/21/1991
Honduras	June 1990	82	M	06/28/1990	11/20/1990
Guyana	June 1990	32	M	06/20/1990	09/20/1990
Hungary	June 1990	20	M	06/21/1990	09/05/1990
Costa Rica	May 1990	28	B	05/21/1990	05/21/1990
Mexico	March 1990	600	M	03/28/1990	07/31/1990
Venezuela	March 1990	104	M	03/30/1990	04/30/1990
Mexico	January 1990	300	B	not used	01/12/1990
Bolivia	December 1989	75	B	12/27/1989	01/12/1990
Poland	December 1989	100	B	12/28/1989	02/09/1990
Bolivia	September 1989	100	B	09/22/1989	12/29/1989
Mexico	September 1989	4124	M	09/25/1989	02/15/1990

Bolivia	July 1989	100	B	07/18/1989	09/15/1989
Venezuela	March 1989	450	B	03/15/1989	04/03/1989
Argentina	October 1988	265	M	11/22/1988	02/28/1989
Mexico	July 1988	300	B	06/01/1988	09/15/1988
Brazil	July 1988	250	M	07/29/1988	08/26/1988
Yugoslavia	June 1988	50	M	06/15/1988	07/01/1988
Argentina	February 1988	550	B	02/24/1988	05/31/1988
Mexico	December 1987	300	B		12/31/1989
Ecuador	December 1987	31	B	12/04/1987	01/26/1988
Argentina	October 1987	200	M	11/13/1987	12/30/1987
Argentina	March 1987	225	M	03/09/1987	07/15/1987
Nigeria	October 1986	37	M	10/31/1986	12/11/1986
Bolivia	September 1986	100	B	not used	11/14/1986
Mexico	July 1986	273	M	06/29/1986	02/13/1987
Ecuador	May 1986	150	B	05/16/1986	08/14/1986
Mexico	December 1985	300	B	not used	12/31/1987
Argentina	June 1985	150	M	06/19/1985	09/30/1985
Argentina	December 1984	500	B	12/28/1984	01/15/1985
Philippines	October 1984	45	B	11/07/1984	12/28/1984
Argentina	March 1984	300	B	not used	09/15/1984
Mexico	December 1983	300	B	not used	12/31/1985
Jamaica	December 1983	50	B	12/29/1983	03/02/1984
Yugoslavia	April 1983	75	M	not used	11/15/1983
Brazil	February 1983	400	B	02/28/1983	03/11/1983
Brazil	December 1982	500	M	not used	11/30/1983
Brazil	December 1982	250	B	12/13/1982	01/11/1983
Brazil	November 1982	450	B	11/29/1982	03/03/1983
Brazil	November 1982	280	B	11/18/1982	02/01/1983
Brazil	October 1982	500	B	10/28/1982	12/28/1982
Mexico	August 1982	600	M	09/16/1982	08/26/1983
Mexico	August 1982	1000	B	08/16/1982	08/24/1982
Mexico	December 1981	300	B	not used	12/31/1983
Netherlands	August 1981	500	B	not used	08/17/1991
Mexico	December 1979	300	B	not used	12/31/1981
Mexico	December 1977	300	B		06/30/1978
Portugal	February 1977	300		02/01/1977	09/01/1977
United Kingdom	December 1976	250	M	not used	08/01/1977
United Kingdom	June 1976	1000	M	06/01/1976	12/09/1976
Mexico	September 1976	235	B	not used	08/25/1977
Mexico	September 1976	365	B	10/02/1976	11/05/1976
Mexico	September 1976	300	B	11/01/1976	04/01/1977
Mexico	December 1975	300	B	not used	12/31/1977
Mexico	December 1973	200	B	not used	12/31/1975
Mexico	December 1971	100		not used	12/31/1973
Mexico	December 1969	100		not used	12/31/1971
Argentina	May 1968	75			05/02/1969
Venezuela	March 1968	50			03/18/1970
Nicaragua	January 1968	5		not used	03/04/1969
Mexico	December 1967	100		not used	12/31/1969

Argentina	May 1967	75		not used	05/02/1968
Colombia	April 1966	13		04/01/1966	06/30/1969
Venezuela	March 1966	50		not used	03/17/1968
Mexico	January 1966	75		not used	12/31/1967
Brazil	February 1965	54		not used	01/12/1966
Chile	February 1965	16		02/04/1965	01/30/1966
Dominican Republic	August 1964	6		08/10/1964	06/30/1967
Chile	March 1964	15		03/13/1964	02/04/1967
Mexico	January 1964	75		not used	12/31/1965
Chile	January 1963	10		01/31/1963	06/30/1966
Philippines	May 1962	25			03/31/1963
Argentina	June 1962	50		06/07/62	06/30/1966

Source: Henning (1999) and U.S. Department of Treasury Resource Center

Table C.2: US Dollar Swap Lines of the Federal Reserve, 1962–present

Country	**Signing Date**	**Amount, millions USD**	**Unilateral/ Bilateral**	**Expiration Date**	**Notes**
Australia	March 2020	60000	September 2020	U	
	April 2009	30000	February 2010	U	Renewal
	September 2008	30000	April 2009	U	
Austria	December 1973	250	December 1998	B	12 months duration, renewed annually
	December 1969	200	December 1973	B	12 months duration, renewed annually
	December 1968	100	December 1969	B	12 months duration, size increased to 200m in October 1969
	July 1967	100	December 1968	B	
	July 1964	50	July 1967	B	12 months duration, renewed annually
	October 1962	50	July 1964	B	3 months duration, renewed every 3 months
Belgium	December 1973	1000	December 1998	B	12 months duration, renewed annually
	December 1971	600	December 1973	B	12 months duration, renewed annually
	December 1969	500	December 1971	B	12 months duration, size increased to

					600m in August 1971
	December 1968	225	December 1969	B	12 months duration, size increased to 300m in May 1969, and to 500m in August 1969
	December 1967	150	December 1968	B	12 months
	March 1967	50	December 1967	B	3 months duration, renewed twice
	December 1964	100	December 1967	B	12 months duration, renewed twice
	December 1962	50	December 1964	B	6 months duration, renewed four times
Brazil	March 2020	60000	September 2020	U	
	April 2009	30000	February 2010	U	Renewal
	October 2008	30000	April 2009	U	
Canada	February 2014	Unlimited	Standing facility	U	
	February 2013	30000	February 2014	U	Renewal
	August 2012	30000	February 2013	U	Renewal
	August 2011	30000	August 2012	U	Renewal
	May 2010	30000	August 2011	U	
	April 2009	30000	February 2012	U	Renewal
	September 2008	30000	April 2009	U	
	January 1994	2000	Standing Facility	U	North America Framework Agreement, renewed annually
	December 1973	2000	December 1994	B	12 months duration, renewed 20 times
	December 1968	1000	December 1973	B	12 months duration, renewed 4 times
	December 1967	750	December 1968	B	12 months duration
	December 1966	500	December 1967	B	12 months duration
	December 1963	250	December 1966	B	12 months duration, renewed twice
	June 1962	250	December 1963	B	3 months duration, renewed 5 times
Denmark	March 2020	30000	September 2020	U	
	April 2009	15000	February 2010	U	Renewal
	September 2008	15000	April 2009	U	
	December 1973	250	December 1998	B	12 months duration, renewed 24 times

	December 1969	200	December 1973	B	12 months duration, renewed thrice
	December 1968	100	December 1969	B	12 months duration, increased to 200m in October 1969
	May 1967	100	December 1968	B	
European Central Bank	February 2014	Unlimited	Standing Facility	U	
	February 2013	240000	February 2014	U	Renewal
	August 2012	240000	February 2013	U	Renewal
	August 2011	240000	August 2012	U	Renewal
	May 2010	240000	August 2011	U	
	April 2009	240000	February 2012	U	Renewal
	September 2008	240000	April 2009	U	Renewal
	August 2008	55000	September 2008	U	Original maturity January 2009, increase in size
	April 2008	50000	August 2008	U	Original maturity January 2009, increase in size
	December 2007	20000	April 2008	U	
France	December 1973	2000	December 1998	B	12 months duration, renewed 24 times
	December 1968	1000	December 1973	B	12 months duration, renewed 4 times
	July 1968	700	December 1968	B	3 months duration, renewed once
	March 1963	100	July 1968	B	3 months duration, renewed 22 times
	Macrh 1962	50	March 1963	B	3 months duration, renewed thrice
Germany	December 1978	6000	December 1998	B	12 months duration, renewed 19 times
	December 1977	4000	December 1978	B	12 months duration
	December 1973	2000	December 1977	B	12 months duration, renewed thrice
	December 1968	1000	December 1973	B	12 months duration, renewed 4 times
	December 1967	750	December 1978	B	12 months duration, increased to 1000m in

					March 1968
	February 1967	400	December 1967	B	6 months duration, renewed once
	August 1964	250	February 1967	B	6 months duration, renewed 4 times
	February 1964	250	August 1964	B	3 months duration, renewed once
	February 1963	150	February 1964	B	3 months duration, renewed thrice
	August 1962	50	February 1963	B	3 months duration, renewed once
Italy	December 1974	3000	December 1998	B	12 months duration, renewed 23 times
	December 1973	2000	December 1974	B	12 months duration, size increased to 3000m in January 1974
	December 1970	1250	December 1973	B	12 months duration, renewed twice
	December 1968	1000	December 1970	B	12 months duration, renewed once, size increased to 1250m in March 1970
	December 1967	450	December 1968	B	12 months duration, size increased to 1000m in October 1968
	March 1967	450	December 1967	B	
	March 1965	450	March 1967	B	12 months duration, renewed twice
	October 1964	250	October 1965	B	12 months
	January 1964	250		B	3 months duration, renewed once
	December 1962	150	January 1964	B	3 months duration, renewed thrice
	April 1962	150	January 1964	B	3 months duration, renewed 5 times
	February 2014	Unlimited	Standing facility	U	
	February 2013	120000	February 2014	U	Renewal

	August 2012	120000	February 2013	U	Renewal
	August 2011	120000	August 2012	U	Renewal
	May 2010	120000	August 2011	U	Renewal
	April 2009	120000	February 2010	U	Renewal
	September 2008	120000	April 2009	U	
	December 1978	5000	December 1998	B	12 months duration, renewed 19 times
	December 1973	2000	December 1978	B	12 months duration, renewed 4 times
	December 1968	1000	December 1973	B	12 months duration, renewed 4 times
	July 1967	450	July 1968	B	12 months duration, size increased to 750m in November 1967
	July 1965	250	July 1967	B	12 months duration, renewed once
	July 1964	150	July 1965	B	12 months duration, size increased to 250m in March 1965
	January 1964	150	July 1964	B	3 months duration, renewed once
	October 1963	100	January 1964	B	3 months duration
South Korea	March 2020	60000	September 2020	U	
	April 2009	30000	February 2010	U	Renewal
	October 2008	30000	April 2009	U	
Mexico	March 2020	60000	September 2020	U	
	April 2009	30000	February 2010	U	Renewal
	October 2008	30000	April 2009	U	
	January 1994	3000	Standing Facility	U	North America Framework Agreement, renewed annually
	December 1996	3000	December 1998	U	12 months duration, renewed once
	February 1995	3000	January 1996	U	12 months duration
	April 1994	3000	December 1995	U	20 months
	December 1993	700	April 1994	U	
	December 1979	700	December 1993	U	12 months duration, renewed 13 times
	December 1975	360	December 1979	U	12 months

					duration, renewed thrice
	December 1973	180	December 1975	U	12 months duration, renewed once, size increased to 360m in August 1975
	December 1968	130	December 1973	U	12 months duration, renewed 4 times
	May 1967	130	May 1968	U	
Netherlands	December 1973	500	December 1978	B	12 months duration, renewed 24 times
	December 1969	300	December 1973	B	12 months duration, renewed thrice
	December 1967	225	December 1969	B	12 months duration, renewed once, size increased to 300m in May 1969
	September 1967	225	December 1967	B	3 months duration
	March 1967	150	September 1967	B	3 months duration, renewed once
	December 1963	100 million	March 1967	B	3 months duration, renewed 12 times
	June 1962	50	December 1963	B	3 months duration, renewed 5 times
New Zealand	March 2020	30000	September 2020	U	
	April 2009	15000	October 2009	U	Renewal
	October 2008	15000	April 2009	U	
Norway	March 2020	30000	September 2020	U	
	April 2009	15000	February 2010	U	Renewal
	September 2008	15000	April 2009	U	
	December 1973	250	December 1998	B	12 months duration, renewed 24 times
	December 1969	200	December 1973	B	12 months duration, renewed thrice
	December 1968	100	December 1969	B	12 months duration, size increased to 200m in October 1969

	May 1967	100	May 1968	B	12 months
Singapore	March 2020	60000	September 2020	U	
	April 2009	30000	February 2010	U	Renewal
	October 2008	30000	April 2009	U	
Sweden	March 2020	60000	September 2020	U	
	April 2009	30000	February 2010	U	Renewal
	September 2008	30000	April 2009	U	
	December 1973	300	December 1998	U	12 months duration, renewed 25 times
	December 1968	250	December 1973	U	12 months duration, renewed 4 times
	July 1967	100	July 1968	U	12 months duration
	July 1964	50	July 1967	U	12 months duration, renewed twice
	January 1963	50	July 1964	U	3 months duration, renewed 5 times
Switzerland	February 2014	Unlimited	Standing Facility	U	
	February 2013	60000	February 2014	U	Renewal
	August 2012	60000	February 2013	U	Renewal
	August 2011	60000	August 2012	U	Renewal
	May 2010	60000	August 2011	U	
	April 2009	60000	February 2010	U	Renewal
	September 2008	60000	April 2009	U	
	April 2008	120000	September 2008	U	Original maturity January 2009, increase in size
	December 2007	4000	April 2008	U	
	December 1978	4000	December 1998	B	12 months duration, renewed 19 times
	December 1973	1400	December 1978	B	12 months duration, renewed 4 times
	December 1971	1000	December 1973	B	12 months duration, renewed once
	December 1968	600	December 1971	B	12 months duration, renewed twice, size increased to 1000m in August 1971
	December 1967	400	December 1968	B	12 months duration
	July 1967	250	December 1967	B	
	January 1967	200	July 1967	B	6 months duration
	July 1964	150	January 1967	B	6 months

					duration, renewed 4 times
	January 1964	100	July 1964	B	3 months duration, renewed once
	July 1962	100	January 1964	B	3 months duration, renewed 4 times
United Kingdom	February 2014	Unlimited	Standing Facility	U	
	February 2013	80000	February 2014	U	Renewal
	August 2012	80000	February 2013	U	Renewal
	August 2011	80000	August 2012	U	Renewal
	May 2010	80000	August 2011	U	
	April 2009	80000	February 2010	U	Renewal
	September 2008	80000	April 2009	U	
	December 1974	3000	December 1998	B	12 months duration, renewed 23 times
	December 1968	2000	December 1974	B	12 months duration, renewed 6 times, size increased to 3000m in March 1974
	May 1967	1350	May 1968	B	12 months duration, size increased to 1500m in November 1967, and to 2000m in March 1968
	May 1965	750	May 1967	B	12 months duration, renewed once
	May 1963	500	May 1965	B	12 months duration, renewed once, size increased to 750m in November 1964
	August 1962	50	August 1963	B	3 months duration, renewed thrice

Source: Minutes of several FOMC meetings 1962–2020
Change in size of swap lines are listed as new swap arrangements

C.2 Appendix B: Robustness Checks

Table C.3: Results of Probit Model

	Federal Reserve Swap		ESF Loan		Swap or ESF Loan	
		w/ Interactions		w/ Interactions		w/ Interactions
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Exposure	0.077	0.109	0.411**	0.240***	0.317**	0.253**
	(0.284)	(0.288)	(0.194)	(0.088)	(0.141)	(0.123)
Import Share	0.867	0.905	0.243	-0.022	0.385*	0.360
	(0.672)	(0.609)	(0.272)	(0.062)	(0.201)	(0.235)
Export Share	-0.571	-0.419	0.136	0.091	-0.668***	-0.676***
	(0.492)	(0.485)	(0.296)	(0.168)	(0.182)	(0.178)
FX Reserves	-1.030**	-0.996**	-0.747	-0.750	-1.166***	-1.133***
	(0.506)	(0.414)	(0.607)	(0.553)	(0.244)	(0.263)
GDP Share	-1.396	-1.295**	-0.789	-0.362*	0.071	0.307
	(2.990)	(0.600)	(0.561)	(0.195)	(0.227)	(0.271)
Inflation	0.346	-7.478	-0.599	0.834	-1.026	-3.270
	(1.839)	(5.978)	(0.413)	(0.547)	(0.740)	(2.034)
Ideal point difference			1.138	-0.683	-1.033	-0.957
w/ the U.S.			(0.857)	(0.473)	(0.762)	(0.806)
Capital Account	1.582*	1.620*	-0.194	-0.129	0.324	0.392
Openness	(0.823)	(0.846)	(0.194)	(0.189)	(0.254)	(0.390)
U.S. Trade	1.183	1.952	1.251***	3.491***	0.472	0.776
Agreement	(2.778)	(1.558)	(0.295)	(1.311)	(0.541)	(0.579)
D.C.A.	0.650	0.642	0.397	2.280**	0.921	0.878
	(1.471)	(1.341)	(0.764)	(1.162)	(0.582)	(0.692)
U.S. unemployment	1.183**	0.955**	-3.633*	-2.603	1.115***	0.968**
	(0.590)	(0.415)	(1.975)	(1.704)	(0.348)	(0.393)
Republican	-0.904***	-0.896***	-0.367	0.072	-1.133***	-1.164***
President	(0.275)	(0.160)	(0.898)	(0.594)	(0.233)	(0.257)
Republican	0.035	0.067	-0.461		-0.501***	-0.421**
Senate	(0.101)		(0.572)		(0.174)	(0.174)
Republican	-0.813*	-0.902***			-0.749***	-0.867***
House	(0.449)	(0.315)			(0.214)	(0.269)
Emerging Market	0.964	-2.850	0.918	0.280	-1.504*	-2.311***
Dummy	(7.042)	(5.762)	(1.086)	(0.530)	(0.789)	(0.817)
Bank Exposure*		1.014**		0.188		0.567**
Crisis		(0.479)		(0.329)		(0.222)
Import Share*		-0.845		0.528		-0.225
Crisis		(0.547)		(0.389)		(0.310)
Export Share*		1.022**		0.540		0.900***
Crisis		(0.423)		(0.532)		(0.327)
FX Reserves*		-2.885***		0.352		-1.206***
Crisis		(0.566)		(0.601)		(0.338)
GDP Share*		-0.810		-0.817***		-1.381***
Crisis		(0.671)		(0.300)		(0.345)
Inflation*		8.267		-1.798***		0.151
Crisis		(5.446)		(0.622)		(1.812)
Ideal point difference				2.447**		-2.897***
w/ U.S.*Crisis				(1.102)		(0.710)
Capital Account		2.832		0.120		-0.293

Openness*Crisis		(2.519)		(0.367)		(0.459)
U.S. Trade		0.604		0.000		2.635**
Agreements*Crisis		(4.920)		(.)		(1.112)
D.C.A.* Crisis		0.750		0.000		0.955**
		(1.023)		(.)		(0.421)
Republican		-1.585		0.995*		-0.472
President*Crisis		(1.861)		(0.522)		(0.454)
Republican		-3.633				-3.055***
Senate*Crisis		(2.948)				(0.877)
Republican		1.308***				0.787**
House*Crisis		(0.484)				(0.363)
Emerging Market		6.282		-0.480		2.417***
Dummy*Crisis		(4.189)		(0.988)		(0.725)
Constant	-9.883	27.340	3.994	-1.947	3.980	14.557
	(29.315)	(26.756)	(3.017)	(1.210)	(3.703)	(9.467)
N	9798	9798	2812	2371	8776	8776

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.4: Results of Linear Probability Model

	Federal Reserve Swap		ESF Loan		Swap or ESF Loan	
		w/ Interactions		w/ Interactions		w/ Interactions
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Exposure	0.004	0.001	-0.001	-0.000	0.005	0.002
	(0.007)	(0.006)	(0.002)	(0.002)	(0.007)	(0.006)
Import Share	0.009	0.009	-0.002	-0.000	0.009	0.009
	(0.008)	(0.008)	(0.002)	(0.001)	(0.008)	(0.008)
Export Share	-0.024**	-0.017*	0.003	0.002	-0.025**	-0.019*
	(0.012)	(0.010)	(0.004)	(0.003)	(0.012)	(0.010)
FX Reserves	-0.116***	-0.091***	-0.010	-0.006	-0.117***	-0.092***
	(0.026)	(0.026)	(0.007)	(0.005)	(0.026)	(0.026)
GDP Share	0.004	0.004	-0.001	-0.001	0.005	0.005
	(0.014)	(0.012)	(0.002)	(0.002)	(0.014)	(0.012)
Inflation	-0.047***	-0.091***	-0.016	0.010	-0.054***	-0.091***
	(0.016)	(0.034)	(0.014)	(0.009)	(0.018)	(0.034)
Ideal point difference	-0.065	-0.066	0.001	-0.004	-0.070	-0.071
w/ U.S.	(0.045)	(0.043)	(0.008)	(0.005)	(0.046)	(0.043)
Capital Account	0.033***	0.028***	-0.001	0.001	0.031***	0.026**
Openness	(0.009)	(0.010)	(0.003)	(0.003)	(0.009)	(0.010)
U.S. Trade	-0.017	-0.007	0.226*	0.291	-0.018	-0.007
Agreement	(0.025)	(0.025)	(0.132)	(0.185)	(0.025)	(0.025)
D.C.A.	0.050	0.044	-0.007	-0.019	0.051	0.043
	(0.063)	(0.060)	(0.006)	(0.013)	(0.063)	(0.060)
U.S. Unemployment	0.136***	0.065***	-0.028	-0.030	0.133***	0.066***
	(0.026)	(0.023)	(0.020)	(0.027)	(0.026)	(0.023)
Republican	-0.075***	-0.067***	-0.001	-0.008	-0.075***	-0.065***
President	(0.016)	(0.016)	(0.004)	(0.010)	(0.016)	(0.016)
Republican	-0.037***	-0.035***	0.005	-0.006	-0.037***	-0.035***
Senate	(0.011)	(0.012)	(0.004)	(0.007)	(0.011)	(0.012)
Republican	-0.022*	-0.026**	-0.007	-0.005	-0.023**	-0.026**

House	(0.011)	(0.012)	(0.006)	(0.007)	(0.012)	(0.012)
Emerging Market	0.004	-0.007	0.039	0.022	0.005	-0.008
Dummy	(0.045)	(0.042)	(0.025)	(0.015)	(0.046)	(0.042)
Bank Exposure*		0.042***		0.001		0.041***
Crisis		(0.014)		(0.004)		(0.014)
Import Share*		-0.014		-0.003		-0.015
Crisis		(0.017)		(0.004)		(0.017)
Export Share*		0.007		0.009		0.011
Crisis		(0.023)		(0.007)		(0.023)
GDP Share*		-0.022		0.004		-0.021
Crisis		(0.042)		(0.007)		(0.043)
Ideal point difference		-0.175**		0.044**		-0.161**
w/ U.S.*Crisis		(0.077)		(0.020)		(0.074)
Capital Account		0.008		0.003		0.008
Openness*Crisis		(0.013)		(0.006)		(0.014)
U.S. Trade		0.051		0.632***		0.040
Agreement* Crisis		(0.055)		(0.218)		(0.056)
D.C.A.* Crisis		0.012		0.053**		0.028
		(0.076)		(0.025)		(0.074)
U.S. unemployment*		0.342***		-0.064		0.308**
Crisis		(0.113)		(0.040)		(0.120)
Republican		-0.036		0.024		-0.044
President*Crisis		(0.032)		(0.023)		(0.031)
Republican		-0.018		0.036		-0.019
Senate*Crisis		(0.035)		(0.024)		(0.035)
Republican		0.144***		-0.043*		0.140***
House*Crisis		(0.030)		(0.026)		(0.030)
Emerging Market		0.034		-0.013		0.037
Dummy*Crisis		(0.094)		(0.019)		(0.096)
Constant	0.476***	0.742***	0.138*	0.035	0.525***	0.750***
	(0.107)	(0.198)	(0.081)	(0.051)	(0.117)	(0.197)
N	8776	8776	2812	2812	8776	8776

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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